

ABE WORKSHOP EVALUATION

The information collected in this form will help the workshop staff evaluate several aspects of the workshop and improve future workshops. Please take a few minutes to answer these questions. Do not put your name on this evaluation.

I. Location of Materials

Give the book and page numbers where the following parts are found in the ABE materials. Use SW for Student Workbook, IG for Instructor's Guide, and AT for Audio Tape Script. For example, if something is on pages 7-9 of the Student Workbook, then you should write SW 7-9.

1. The "Design and Use of the Student Workbook" for Level I. _____
2. The "Objective" for the Level I section on Linear Measurement. _____
3. "The Teaching Sequence Can be....." for the Level I section on Linear Measurement. _____
4. The "Vocabulary" for the Level I section on Measurement of Weight. _____
5. A list of "Resources and Materials" for Level I. _____
6. A recipe "Millispread for Bread" for Level I. _____
7. The script for the section on Measurement of Capacity for Level I tapes. _____
8. A Level II section on Kilograms which shows people "Using Metrics at Work and at Home". _____
9. The "Design and Use of the Student Workbook" for Level II. _____
10. An "Index of Occupations" in the Level II student materials. _____
11. Level III "Metric Activities" on Litres. _____
12. A list of "References" for Level III. _____
13. What the Level III instructor needs to know about "Metric Notation". _____

Figure 6



This part has 13 questions. Read each question carefully. There are two kinds of questions. One type of question is a multiple-choice question. The other type of question asks you to fill in the blank. Write your answers in the spaces provided.

1. A centimetre is about _____.

- (1) the width of a fingernail.
- (2) the thickness of a dime.
- (3) the capacity of a spoon.
- (4) the length of this room.

2. A rock has a mass of 128 grams. Using metric symbols, this can also be written as 128 _____.

3. The width of this sheet of paper is _____ mm.

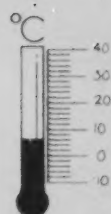
4. How much salt is in this spoon? _____



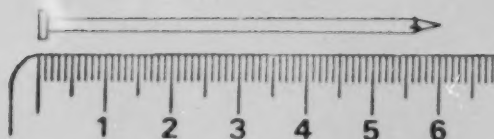
5. A measure that is the same as 52 ml is _____.

- (1) 52 000 litres
- (2) 5 200 litres
- (3) 0.052 litre
- (4) 0.52 litre

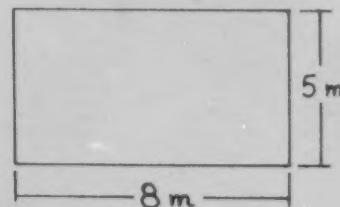
6. The temperature shown on this thermometer is _____.



7. This nail is _____ cm long.



8. The area of this rectangle is _____ m^2 .



9. A measure that is the same as 934 kilograms is _____.

- (1) 0.934 g
- (2) 934 000 g
- (3) 9.34 g
- (4) 93 400 g

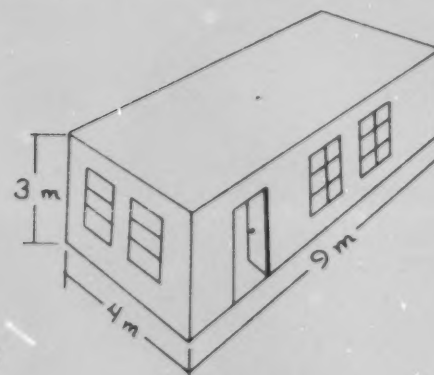
10. If you use the symbol for millilitres, 28 millilitres can be written as 28 _____.

11. If you use metric symbols, 13 cubic metres can also be written as 13 _____.

12. A square metre is about the size of _____.

- (1) a card table top.
- (2) your thumbnail.
- (3) the floor of the classroom.
- (4) a 25¢ coin (quarter).

13. The area of the floor of the house in this picture is _____.



Some participants did not seem to think that this was a very effective means of evaluation. One participant answered the first six items and then wrote, "I think I have demonstrated by now that I know how to use a table of contents." Interestingly, this person missed one of the six items that was answered.

Table 4 contains the results of these evaluations. Results are given for each workshop (Region) and the totals for all ten workshops. Data include the number of participants who completed the evaluation (n), the number of participants that got that item correct, the number that got it incorrect, the number who gave no answers, and the percent, of those who answered the item, that got it correct.

The evaluation in Region IV (Atlanta) was conducted the second day. The instructor did not tell participants to bring their set of materials to the workshop, and so only two of the fourteen people were able to complete the evaluation.

On only two items did participants consistently not do well. Both items 8 and 11 asked participants to locate a subsection of the material, and can be considered two of the most difficult items on the instrument. Overall, participants got 83.6% of the items correct.

The second part of the ABE evaluation was to determine the metric knowledge of the participants at the conclusion of the workshop. This measure might have been more useful had a pre-test been given to determine the metric knowledge of the participants prior to the beginning of the workshop. Results of the post-test over participants' metric knowledge are given in Table 5. Results are given for each item for each workshop and for all the workshops. The regions are listed in the order in which the workshops were conducted.

There were some interesting responses that were consistently given

TABLE 4

SUMMARIES OF THE ABE EVALUATION ON KNOWLEDGE OF MATERIALS

1. The "Design and Use of the Student Workbook" for Level I. (IG 4-5)

Region*	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	9	21	11	10	7	19	8	2	9	11	107
incorrect	0	1	2	2	0	1	0	0	1	2	9
no answer	0	0	0	0	2	0	0	12	0	1	15
% correct	100	96	85	83	100	95	100	100	90	85	92

2. The "Objective" for the Level I section on Linear Measurement. (IG 8)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	7	21	13	12	7	17	8	2	9	12	108
incorrect	1	1	0	0	0	3	0	0	1	1	7
no answer	1	0	0	0	2	0	0	12	0	1	16
% correct	88	96	100	100	100	85	100	100	90	92	94

3. "The Teaching Sequence Can be..." for the Level I section on Linear Measurement. (IG 14-21)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	6	17	9	12	6	16	7	2	4	8	87
incorrect	2	4	3	0	1	4	1	0	6	5	26
no answer	1	1	1	0	2	0	0	12	0	1	18
% correct	75	81	75	100	86	80	88	100	40	62	77

*This refers to the ten USOE Regions. They are given in the order in which workshops were given. The regions, and workshop cities are: IX San Francisco, II New York, III Philadelphia, I Boston, VIII Denver, V Chicago, X Seattle, IV Atlanta, VI Dallas, VII Kansas City

Table 4 (cont.)

4. The "Vocabulary" for the Level I section on Measurement of Weight. (IG 22)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	6	18	8	9	6	15	8	2	5	12	89
incorrect	2	3	4	3	1	5	0	0	5	1	24
no answer	1	1	1	0	2	0	0	12	0	1	18
% correct	75	85	67	75	86	75	100	100	50	92	79

5. A list of "Resources and Materials" for Level I. (IG 58-61)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	8	15	9	10	6	15	7	2	9	9	90
incorrect	0	6	3	2	1	5	1	0	1	3	22
no answer	1	1	1	0	2	0	0	12	0	2	19
% correct	100	75	75	83	86	75	88	100	90	75	80

6. A recipe "Millispread for Bread" for Level I. (SW 19)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	9	21	11	12	5	20	6	2	10	13	109
incorrect	0	0	1	0	2	0	2	0	0	0	5
no answer	0	1	1	0	2	0	0	12	0	1	17
% correct	100	100	92	100	71	100	75	100	100	100	96

Table 6 (cont.)

7. The script for the section on Measurement of Capacity for Level I tapes. (AT 25-31)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	6	16	9	12	6	17	7	2	9	9	93
incorrect	3	4	3	0	1	3	1	0	1	4	20
no answer	0	2	1	0	2	0	0	12	0	1	18
% correct	67	80	75	100	86	85	88	100	90	69	82

8. A Level II section on kilograms which shows people "Using Metrics at Work and at Home." (SW 32-34)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	5	12	7	8	4	14	6	1	8	6	71
incorrect	3	8	5	4	3	6	2	1	2	6	40
no answer	1	2	1	0	2	0	0	12	0	2	20
% correct	63	60	58	67	57	70	75	50	80	50	64

9. The "Design and Use of the Student Workbook" for Level II. (IG 4-5)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	8	18	9	11	7	20	8	2	9	12	104
incorrect	0	2	3	1	0	0	0	0	1	1	8
no answer	1	2	1	0	2	0	0	12	0	1	19
% correct	100	90	75	92	100	100	100	100	90	92	93

Table 4 (cont.)

10. An "Index of Occupations" in the Level II student materials. (SW 62)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	7	15	8	11	7	18	8	2	10	11	97
incorrect	0	5	4	1	0	2	0	0	0	1	13
no answer	2	2	1	0	2	0	0	12	0	2	21
% correct	100	75	67	92	100	90	100	100	100	92	88

11. Level III "Metric Activities" on Litres. (SW 35)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	5	7	9	10	4	12	6	1	7	13	74
incorrect	3	13	3	2	3	8	2	1	3	0	38
no answer	1	2	1	0	2	0	0	12	0	1	19
% correct	65	35	75	83	57	60	75	50	70	100	66

12. A list of "References" for Level III. (IG 33-36)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	8	18	12	11	6	18	8	1	10	12	104
incorrect	0	2	0	1	1	2	0	1	0	1	8
no answer	1	2	1	0	2	0	0	12	0	1	19
% correct	100	90	100	92	86	90	100	50	100	92	93

Table 4 (cont.)

11. What the Level III instructor needs to know about "Metric Notation".
(IG 12-13)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	6	12	9	12	7	16	7	2	8	12	91
incorrect	2	8	3	0	0	4	1	0	2	1	21
no answer	1	2	1	0	2	0	0	12	0	1	19
% correct	75	60	75	100	100	80	88	100	80	92	81

Totals for all 13 items.

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	117	286	169	156	117	260	104	182	130	182	1703
correct	90	211	124	140	78	217	95	23	107	140	1225
incorrect	16	57	34	16	13	43	9	3	23	26	240
no answer	11	18	11	0	26	0	0	156	0	16	238
% correct	85	79	78	90	86	83	91	88	82	84	84

by participants. For example, item 3 asked participants to measure the width of the paper (on which the instrument was printed). Several participants gave a response of 1 or .2. It was not until after several workshops had been conducted that the reason for these responses was discovered. Participants understood or interpreted the word "width" to mean thickness and thus were trying to express the thickness of the sheet of paper. A check of the participants' responses indicated that a total of 13 (11.6%) of those that responded to the item gave this type of response. Although the number of no answers (19) was considerably higher for this item than for any other, this is primarily due to the fact that participants in Region I (Boston) did not have any rulers when they completed the evaluation and were told to leave this item blank.

Item 6 asked for the temperature that was indicated on a picture of a thermometer. In order to get all the items for the evaluation sheet to fit on one page, the picture of the thermometer was reduced. As a result it was difficult to read. The correct response was 6°C . When grading the response sheets, any response of 5, 6, or 7°C was counted as correct. After several workshops it was noticed that many participants had given a response of 8°C . This is an incorrect response, but because of the smaller picture, one that could easily be made. A total of 20 people (15.7%) gave this response. This means that if this response (8°C) is counted as correct, then 91% of the respondents got this item correct.

Overall, respondents got 83.7% of the items correct. If the manner in which these two items were scored was changed, this would be increased to 85.9%.

There were some other interesting response patterns. Some of these would probably change with additional instruction since only a minimal amount of time was spent discussing them. Item 11 asked for 13 cubic

metres to be expressed using metric symbols, i.e. 13 m^3 . About 26 people gave cm^3 , cm , or m^2 as the correct response. For some of these (for example, cm for cubic metre) it is fairly easy to see how this answer was selected. For others, it is not.

Items 5 and 9 are related to each other. In item 5, people were asked to convert 52 ml to litres; in item 9, they were asked to convert 934 kilograms to grams. Item 5 required division since 52 ml is the same as $52 \div 1000 = 0.052$ litres. Item 9 required multiplication since 934 kg is the same as $934 \times 1000 = 934\,000$ g. Normally one thinks that multiplication is easier than division. Yet, 79.2% of the respondents got item 5 correct, and only 70.4% got item 9 correct. This is an interesting result that might warrant some study.

Every workshop except the one in Philadelphia resulted in respondents getting 79% or more of the items correct. In Philadelphia this dropped to 73%. There was no discernable reason for this low percent of correct items. No workshop before (there were two) and at no other, until the Atlanta workshop when the ABE instructor was ill, and the format was changed, did respondents get less than 85% of the items correct. It thus appears, with the possible exception of the Philadelphia workshop, that participants did gain an adequate knowledge of the ABE metric materials, and that they left the workshop with a good knowledge of the metric system.

During the last four workshops another measure was taken to help determine the effectiveness of the workshops for training participants to train others in the use of the ABE materials. This evaluation form consisted of two questions: 1. "Are you now prepared to train others to use the Center's metric instructional packages?" and 2. "What else do you need to train others to use these packages?" Responses for each workshop to these two questions are given in Figure 7. Results for the

1. Are you now prepared to train others to use the Center's
metric instructional packages? _____

2. What else do you need to train others to use these
these packages? _____

REGION X
Seattle, Washington

ABE

1. Are you now prepared to train others to use the Center's metric instructional packages?

Yes - 3

No - 1

With extra work - 3

Comments: Somewhat. I think I can do it, but I have not led one before.

Not quite yet.

Provided I spend some additional time of my own studying materials.

2. What else do you need to train others to use these packages?

Comments: Time to read through the materials and work through the procedures. It looks like a very good teaching tool for ABE. Clears up many areas of confusion.

The material was very well presented. A person would need just a little more time to study the material on their own, if they knew nothing about metrics to start with, before they would want to start a workshop.

Develop more familiarity with all materials. Some training on the "how to's" of conducting a workshop. Interested, receptive people. The various items which are recommended to use plus any of my own that would work well. Time to lead them--this is, time to prepare and conduct. I would like specific mini-course in self-instructional type of course on using metrics.

VU Graph slides.

REGION IV
Atlanta, Georgia

ABE

1. Are you now prepared to train others to use the Center's metric instructional packages?

Yes - 9 No - 2 Not completely - 1 No answer - 2

Comments: Yes, to an appreciable degree.

Yes (with a day to study and familiarize myself with the wealth of material). Perhaps I am saying I need time to "digest" and to learn symbols, etc.

2. What else do you need to train others to use these packages?

Comments: To develop my own package of materials.

Possibly a list of the basic materials (metric stick, containers, etc.) a teacher would need to teach metrics.

Materials to provide other teachers.

Shopping list of materials.

Quantities of materials and demonstration devices.

Metric measuring devices.

Other suggested strategies.

Equipment, printouts, plan/outline, time.

More reviews on the materials.

More familiarity with metric system, and materials in packages.

I need to have more knowledge about the metric system itself. I feel that to teach it, I would have to master it myself.

REGION VI
Dallas, Texas

ABE

1. Are you now prepared to train others to use the Center's metric instructional packages?

Yes - 5

No - 1

Not completely - 3

No answer - 1

2. What else do you need to train others to use these packages?

Comments: Some more preparation.

A couple of more workshops or more knowledge dealing with the metric system.

Adapt materials to local needs in the state, and develop a training plan.

I will only need time to digest what I have gone through in this workshop.

Teachers with a desire to learn the metric system, and metric teaching aids.

I would need to be thoroughly versed on these packets as I can see questions asked that I could not answer at this time. However, another day should fill this particular void.

Leadership and state level coordination from Arkansas Vo-Tech people.

A basic package of materials for the hands-on activities.

REGION VII
Kansas City, Missouri

ABE

1. Are you now prepared to train others to use the Center's metric instructional packages?

Yes - 9

No - 1

Not completely - 3

No Answer - 1

2. What else do you need to train others to use these packages?

Comments: Experience (although I had worked much with direct teaching of students before.)
Time.

To review the materials given to us and to use them as a basic guide to work with students. I feel the adult students, as well as others, will need to have a preparatory session to acquaint them with the basic parts of the metric system before getting into the materials effectively.

Time for planning; time for studying; an expert or two, comfortable in math.

People who are willing to also help put on the workshops.

Packets for them, funds to put on the training, metric supplies and materials.

Nothing that is non-attainable.

To study those materials, survey my class, and gather appropriate materials.

I'll have to spend some time to digest this material.

More time to digest material.

Hands-on materials, more time to go through and actually use some of the materials with students. Planning time to prepare supplementary audio-visual supplies and obtain film(s).

More time to get familiar with the. Assessment of the staff to see how to approach using them.

Time for myself to absorb information presented. Feel need for preliminary activities, which I think I can handle.

first questions were Yes - 26, No - 5, Not completely - 10, and No answer - 4. All of the people who responded "not completely" wrote that they would first need to spend more time studying the materials on their own. Thus, they did not seem to see any deficiencies in the workshop content. All they needed was some time by themselves to prepare for a workshop.

At the conclusion of each workshop, an overall evaluation was completed by the participants (Figure 8). The first six questions were meant to cover the complete workshop. The last nine questions referred to the specific session (ABE or V-T) that the participant attended. Reports have been filed after each workshop which gave detailed responses and all comments for each workshop. Table 6 contains the average of the responses of the ABE participants for each question, by workshop, and by the total of the ten workshops. The lowest results concerned the meeting rooms, registration procedures, and the overall organization.

For the most part, the meeting rooms for the ABE sessions were very poor. They tended to be small and have poor ventilation. Because the ABE session at the first seven workshops was to include having the participants do some of the activities in the ABE materials, more room was needed than would have been adequate for a lecture to the same number of people. In fact, it soon became evident that a room large enough to accommodate approximately 50 people in a lecture setting was needed for the ABE sessions if participants were to be expected to move around and work some of the activities.

Criticism of the registration procedures tended to focus on pre-registration. There was often poor communication about the workshops. Sometimes this was the fault of the CVE staff and sometimes it was the

Please indicate in
which program you
participated.
(Check one)

_____ ABE
_____ VT

City _____

* Region _____

METRIC WORKSHOP EVALUATION

The information collected in this form will help the staff evaluate the quality of the metric workshops. The information will also be used to help improve future programs. Please take a few minutes to provide your feedback. All data will be held in strict confidence.

QUALITY RATING

	Excellent	Good	Average	Fair	Poor
1. Workshop information	A	B	C	D	F
Comment:	_____				
2. Registration procedures	A	B	C	D	F
Comment:	_____				
3. Meeting rooms	A	B	C	D	F
Comment:	_____				
4. Overall Organization of the workshop	A	B	C	D	F
Comment:	_____				
5. Opening Comments	A	B	C	D	F
Comment:	_____				



THE CENTER FOR VOCATIONAL EDUCATION

Figure 8

113

6. Closing Comments

A

B

C

D

F

Comment: _____

Note: Respond to items 7 to 14 in terms of the specific component (VT or ABE) you attended.

7. Content (usefulness, comprehensiveness, and clarity of the information presented)

A

B

C

D

F

Comment: _____

8. Instruction (variety, sequence, A/V support, and time allotted to various instructional formats)

A

B

C

D

F

Comment: _____

9. Instructors (preparation, effectiveness and responsiveness to participants needs)

A

B

C

D

F

Comment: _____

10. Printed instructional materials (usefulness during training and to take home)

A

B

C

D

F

Comment: _____

11. Professional interaction with instructors and other participants on problems of personal interest

A

B

C

D

F

Comment: _____

Figure 8 (Cont.)

12. Session as a whole

A

B

C

D

F

Comment: _____

II. GENERAL INFORMATION

Circle the most appropriate response for each question. Please explain your answer in the space provided for comments.

13. How well did the session meet the expectations you had before you came?

1

2

3

4

5

Extremely Well

Adequately

Not at All

Comment: _____

14. How appropriate was the instruction for you?

1

2

3

4

5

a. Too Technical

Just Right

Too Elementary

1

2

3

4

5

b. Too Formal

Just Right

Too Informal

Comment: _____

III. RECOMMENDATIONS

15. What specific suggestions would you make for improving future workshops in metric education?

Thank you!

Figure 8 (Cont.)



THE CENTER FOR VOCATIONAL EDUCATION

115

fault of personnel at the state level. Several participants (ABE and V-T) related tales of calls to their state director only to have the state director deny any knowledge of the workshops.

Another criticism of the pre-registration procedure concerned the failure to mail agendas with the workshop information. In response to this criticism, agendas were mailed to participants in the last five workshops. The decision to revise the workshop for the last three meetings resulted in a different kind of criticism because now participants had the agenda but it was no longer applicable. Also, the agendas, as mailed, gave the impression to some that the workshop did not begin until 10:00, and that the period between 9:00 and 10:00 was to be spent on registration and coffee. This was not the intention of the staff. In fact, the letter asking them to participate stated that the workshop would begin at 9:00. However, this confusion could have been prevented if the agendas had stated, "8:30 - 9:00 Registration, 9:00 - 9:45 General Introduction."

A final criticism of the pre-registration procedure was the fact that the registration materials did not include the specific workshop rooms. In most places this did not cause undue difficulties since the hotel/motel usually had the site posted. The major problem occurred in Boston/Fall River and in Dallas. The problem in Dallas was caused by the fact that there were several governmental meetings in that motel, and several participants went to the wrong meeting. In Boston/Fall River the workshop was held at Bristol Community College. The room number and building for registration was given in the letter to participants. However, the morning of the workshop personnel at Bristol Community College changed the site of registration. One staff member quickly posted signs giving the corrected room, and so this caused few problems.

Criticisms of the overall organization of the workshops were not very specific. Perhaps the most common complaint seemed to be a feeling of some of the ABE participants that they were not as important as the vocational personnel. This feeling seemed to vary among the workshops. Whether this variance was a result of attitudes participants brought with them from their states, or a result of an attitude conveyed by the workshop staff cannot be determined. In one workshop, ABE participants specifically stated that they felt that the workshop would have been better if they had spent the entire workshop together. This particular workshop (Kansas City) followed the revised format that was used for the last three workshops. This format resulted in much more involvement of participants in both learning and teaching. Participants worked together in groups. All these factors seemed to result in much more group identity.

The only other item that consistently received lower ratings was the ABE instruction. It is interesting to note that the total rating of the instruction for the last two workshops was 3.28, while the total rating of the first seven workshops was 2.79. This would seem to indicate that the revised format that was adopted for the last three workshops worked considerably better than did the format for the first seven workshops. (Because the instructor for the ABE sessions was sick during the Atlanta workshop, the ratings of the instruction for that workshop are not included in the combined ratings given above.) It would appear that the format used in the last three workshops for the ABE sessions was far superior to the format used in the first seven workshops.

Perhaps the most gratifying results of the workshops are the ratings that were given to the ABE instructional materials. Overall, for the ten workshops, the ABE materials received a rating of 3.63. At only one workshop did the materials receive a rating below 3.50. This rating,

from the New York workshop, was a 3.00. The combined ratings from the other nine workshops gave the ABE materials a rating of 3.76. The materials received many compliments as to their appropriateness for ABE learners, their artwork, the relevancy of the examples, and the apparent lack of any sex or minority bias.

There are many different ways to assess the effectiveness of the workshops. One method is to look at the ratings of question 12 on the overall evaluation (See Table 5), which gave the ratings of the session as a whole. Using this criteria, the workshops that received the four highest ratings, in order, were Dallas, Philadelphia, Seattle, and Kansas City.

A second method is by adding the ratings for questions 7 through 12. These six questions all dealt with the curriculum and instruction of the workshops. These sums, from Table 6, make the four highest-rated workshops, in order: Dallas, Kansas City, Denver, and Philadelphia.

A third method is to divide the sum of the ratings for questions 7 through 12 by the sum of the ratings for questions 1 through 6. This attempts to negate any affects the answers to the first six questions might have had on the answers to the last six. For example, if the sum of questions 1-6 is 18 and of questions 7-12 is also 18, then this ratio is 1.00. But another workshop with a total of 12 on questions 1-6 and a total of 18 on questions 7-12 would have a ratio of 1.50. Both examples had a total of 18 on questions 7-12, but the second example is rated higher because the ratio of 1.5 indicates that this was achieved in spite of poor ratings on questions 1-6. Using this method, the four highest workshops, in order, were Kansas City, Boston, Dallas, and Philadelphia.

A fourth method is to look at the percent of items participants got correct on the questions over their knowledge of the ABE materials. Rated in order, the four highest workshops were Seattle, Boston, Atlanta, and Denver.

TABLE 5

SUMMARIES OF THE ABE EVALUATIONS ON KNOWLEDGE OF METRIC SYSTEM

1. A centimetre is about (1)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	9	20	13	11	9	18	8	13	8	12	121
incorrect	0	0	0	1	0	1	0	1	2	2	7
no answer	0	2	0	0	0	1	0	0	0	0	3
% correct	100	100	100	92	100	95	100	93	80	86	95

2. A rock has a mass of 128 grams. Using metric symbols, this can also be written as 128 (g)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	9	17	9	8	7	17	8	11	7	9	102
incorrect	0	3	4	4	2	3	0	2	2	3	23
no answer	0	2	0	0	0	0	0	1	1	2	6
% correct	100	85	69	67	78	85	100	85	78	75	82

3. The width of this sheet of paper is (215)mm.

Region	IX	II	III	I*	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	5	14	3	0	4	5	5	4	5	9	54
incorrect	4	9	8	0	4	15	3	10	4	4	58
no answer	0	2	2	12	1	0	0	0	1	1	19
% correct	56	70	27	0	50	25	62	29	56	69	48

*No rulers were available when this evaluation was taken.

TABLE 5 (Cont.)

4. How much salt is in this spoon? (5 ml)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	7	20	13	10	6	18	7	11	8	10	110
incorrect	2	0	0	0	3	2	0	3	0	0	10
no answer	0	2	0	2	0	0	1	0	2	4	11
% correct	78	100	100	100	67	90	100	79	100	100	92

5. A measure that is the same as 52 ml is (3)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	9	17	4	12	7	18	5	12	5	10	99
incorrect	0	3	9	0	2	1	3	2	4	2	26
no answer	0	2	0	0	0	1	0	0	1	2	6
% correct	100	85	31	100	78	95	62	86	56	83	79

6. The temperature shown on this thermometer is (6° C)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	7	14	9	10	9	12	7	9	7	12	96
incorrect	2	6	4	2	0	8	1	5	2	1	31
no answer	0	2	0	0	0	0	0	0	1	1	4
% correct	78	70	69	83	100	60	88	79	67	92	76

TABLE 5 (Cont.)

7. This nail is (6) cm long.

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	8	19	13	12	9	20	7	11	10	13	122
incorrect	1	0	0	0	0	0	0	3	0	1	5
no answer	0	3	0	0	0	0	1	0	0	0	4
% correct	89	100	100	100	100	100	100	79	100	93	96

8. The area of this rectangle is (40) m².

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	9	20	12	12	9	20	8	12	9	14	125
incorrect	0	0	1	0	0	0	0	2	1	0	4
no answer	0	2	0	0	0	0	0	0	0	0	2
% correct	100	100	92	100	100	100	100	86	90	100	97

9. A measure that is the same as 934 kilograms is (2)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	6	10	10	6	8	16	7	12	6	7	88
incorrect	3	10	3	6	1	4	1	2	3	4	37
no answer	0	2	0	0	0	0	0	0	1	3	6
% correct	67	50	77	50	89	80	88	86	67	64	70

TABLE 5 (Cont.)

10. If you use the symbol for millilitres, 28 millilitres can be written as 28 (ml)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	8	19	9	11	8	20	7	11	8	13	114
incorrect	1	1	4	1	1	0	1	3	2	0	14
no answer	0	2	0	0	0	0	0	0	0	1	3
% correct	89	95	69	92	89	100	88	79	80	100	89

11. If you use metric symbols, 13 cubic metres can also be written as 13 (m³)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	8	14	7	9	6	18	6	11	6	9	94
incorrect	1	5	5	3	3	2	2	3	4	4	32
no answer	0	3	1	0	0	0	0	0	0	1	5
% correct	87	74	58	75	67	90	75	79	60	69	75

12. A square metre is about the size of (1)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	7	20	13	11	9	20	8	14	9	13	124
incorrect	2	0	0	1	0	0	0	0	1	0	4
no answer	0	2	0	0	0	0	0	0	0	1	3
% correct	78	100	100	92	100	100	100	100	90	100	97

TABLE 5 (Cont.)

13. The area of the floor of the house in this picture is (36 m²)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	9	22	13	12	9	20	8	14	10	14	131
correct	8	18	6	12	8	20	8	12	9	13	114
incorrect	1	4	7	0	1	0	0	1	1	1	13
no answer	0	3	0	0	0	0	0	1	0	0	4
% correct	89	94	46	100	89	100	100	92	90	93	90

Totals for all 13 items

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	117	286	169	156	117	260	104	182	130	182	1703
correct	100	222	121	124	99	222	91	143	97	144	1363
incorrect	17	35	45	18	17	36	11	37	26	22	264
no answer	0	29	3	14	1	2	2	2	7	16	76
% correct	85	86	73	87	85	86	89	79	79	87	84

TABLE 6
SUMMARIES OF OVERALL EVALUATION BY ABE PARTICIPANTS

USOE Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total Avg.
Number of ABE participants completing evaluation	9	22	14	12	10	19	7	14	8	12	127
1. Workshop information (4.00=perfect score)	3.67	3.09	3.36	2.58	3.30	3.00	3.29	3.17	3.75	2.50	3.12
2. Registration procedures	2.89	3.32	3.00	2.25	2.70	3.05	3.14	3.36	2.12	2.75	2.93
3. Meeting Rooms	3.00	1.48	3.36	2.23	3.20	2.31	3.71	3.21	3.38	2.83	2.67
4. Overall Organization	3.00	3.00	2.86	2.75	3.20	2.89	3.43	2.69	3.62	2.73	2.99
5. Opening Comments	3.14	3.33	2.83	2.91	3.33	3.23	3.29	2.58	3.71	2.33	3.11
6. Closing Comments	3.00	3.14	3.00	2.57	2.88	2.79	3.40	2.90	2.62	2.83	2.92
7. Content	3.00	2.90	3.36	2.92	3.18	3.21	3.00	3.07	3.38	3.33	3.13
8. Instruction	2.78	2.79	3.07	2.67	3.11	2.47	2.86	2.54	3.43	3.27	2.83
9. Instructors	3.33	3.10	3.29	3.23	3.27	3.00	3.57	3.14	3.88	3.50	3.27
10. Printed Inst. Materials	3.67	3.00	3.71	3.92	3.60	3.74	3.86	3.50	4.00	3.83	3.63
11. Professional Interaction	3.33	3.39	3.14	3.83	3.60	3.28	3.27	3.50	3.62	3.58	3.44
12. Session as a Whole	3.00	3.00	3.38	3.07	3.20	2.94	3.26	3.17	3.50	3.21	3.15
13. Expectations Met (1.00=perfect score)	2.11	2.68	2.38	2.17	2.33	2.53	2.57	2.15	1.57	2.00	2.32
14a Instruction: Technical (3.00=Just right)	3.33	3.15	3.43	3.33	3.20	3.17	3.00	3.09	3.32	3.17	3.24
14b Instruction: Formality (3.00=Just right)	3.00	2.80	3.00	3.09	3.00	3.06	2.86	3.10	3.00	3.00	2.99
Total: Ques. 1 - 6 (A)	18.70	17.36	18.41	15.29	18.61	17.27	20.26	17.91	19.20	15.97	17.74
124 Ques. 7 - 12 (B)	19.11	18.18	19.95	19.64	19.96	18.64	19.82	18.92	21.81	20.72	19.45
B ÷ A	1.02	1.05	1.08	1.28	1.07	1.08	0.98	1.06	1.14	1.30	1.10

116

125

A fifth, and final, method is to determine the ranking of each workshop on each of four parts: knowledge of materials, knowledge of the metric system, the sum of questions 1-6, and the sum of question 7-12. By adding the rank of each workshop (see Table 7) on each of these four parts, and then ranking these sums, a combined ranking is determined. Using this method, the four best workshops were Seattle, Denver, Dallas, and Kansas City.

Two cities appear on four of these five methods for ranking the workshops. These two workshops, Dallas and Kansas City, both occurred after the workshop format was revised. There does not appear to be any doubt that the format used for the last three workshops, at least as regards the ABE session, resulted in much better workshops.

Vocational-Technical

The first ten items on the V-T evaluations (Figure 9) were designed to determine how well the participants knew the contents of the packages. Participants were allowed to use the V-T materials that they had been given. The content of the packages were not listed in a table of contents, but were described on the inside front cover. All of the information had also been discussed during the workshop.

The results of the evaluations on participants' knowledge of the V-T materials for each of the ten workshops, and overall, are given in Table 8. The data for each item included the number of people who completed the evaluation, the number who answered the item correctly, the number who answered it incorrectly, and the number who did not answer the item. The percent correct is based on the number of people who answered the item. Over all the workshops, participants got 87.7% of the items correct.

The ten items to be identified included five sections of teacher support materials (Teaching and Learning the Metric System, Testing

TABLE 7

RANKING OF WORKSHOPS ON KNOWLEDGE OF ABE MATERIALS, KNOWLEDGE
OF METRIC SYSTEM, AND OVERALL EVALUATIONS FOR ABE SESSIONS

Workshop		Knowledge of Material		Knowledge of Metrics		Overall Evaluation				Totals	
City	Region	%	Rank	%	Rank	Ques 1 - 6		Ques 7 - 12		Sum of Ranks	Final Rank
San Francisco	IX	85	5	85.3	6	18.70	3	19.11	7	21	5
New York	II	79	9	86.0	5	17.36	7	18.11	10	31	10
Philadelphia	III	78	10	73	10	18.41	5	19.95	4	29	9
Boston	I	90	2	86.6	3	15.29	10	19.64	6	21	5
Denver	VIII	86	4	85.1	7	18.61	4	19.96	3	18	2
Chicago	V	83	7	86.1	4	17.27	8	18.64	9	28	8
Seattle	X	91	1	91	1	20.26	1	19.82	5	8	1
Atlanta	IV	88	3	79.4	8	17.91	6	18.92	8	25	7
Dallas	VI	82	8	78.9	9	19.20	2	21.81	1	20	4
Kansas City	VII	84	6	86.7	2	15.97	9	20.72	2	19	3

VOCATIONAL-TECHNICAL WORKSHOP EVALUATION

Please take a few minutes to answer these questions. The information collected in this evaluation will help the workshop staff improve future workshops. Fill in the region at the top of the page but do not sign this form.

I. CONTENTS OF THE VOCATIONAL-TECHNICAL PACKAGES

Choose the correct letter to identify the contents of each of the following components of the packages.

- | | |
|--|--|
| 1. Teaching and Learning the Metric System | a. answers to student exercises and "Testing Metric Abilities" |
| 2. Unit 1 | b. background information and exercises on metric-metric equivalents |
| 3. Unit 2 | c. background information and exercises on selecting and using metric instruments, tools and devices |
| 4. Unit 3 | d. an overview of the contents of the package plus suggestions for using the instructional materials. |
| 5. Unit 4 | e. background information and hands-on exercises for a general introduction to metric measurement |
| 6. Unit 5 | f. test items to be used with each unit |
| 7. Testing Metric Abilities | g. selected annotated references of written materials, metric suppliers, and information sources. |
| 8. Answers to Exercises and Test | h. background information, conversion formulae and charts for metric-customary conversion |
| 9. Tools and Devices List | i. background information, tables, and exercises to introduce the metric units specific to an occupation |
| 10. References | j. a list of tools and devices used to set up resource tables and those metric tools and devices particular to an occupation |

Figure 9

II. METRIC KNOWLEDGE

Read each question carefully and circle the letter next to the correct answer.

1. The correct way to write 20 centimetres is:

[A] 20 cm
[B] 20 Cm
[C] 20cm
[D] 20 cm.

2. Estimate the length of the line segment below:

[A] 23 grams
[B] 6 centimetres
[C] 20 millimetres
[D] 14 pascals

3. A square metre is about the area of:

[A] this sheet of paper
[B] a card table top
[C] a bedspread
[D] a postage stamp

4. The mass of an adult will be measured in:

[A] centimetres
[B] kilopascals
[C] kilograms
[D] kilometres

5. 112 centimetres is the same as:

[A] 1120 metres
[B] 112 metres
[C] 11.2 metres
[D] 1.12 metres

6. 0.5 litre is the same as:

[A] 5000 ml
[B] 500 ml
[C] 50 ml
[D] 5 ml

7. Degrees Celsius are measured with a:

[A] thermometer
[B] scale
[C] ruler
[D] pressure gage

8. The replacement unit for the fluid ounce is the:

[A] millimetre
[B] kilopascal
[C] gram
[D] millilitre

Use this conversion table to answer questions 9. and 10.

g	oz.	g	oz.
100	3.53	10	0.35
200	7.05	20	0.71
300	10.58	30	1.06
400	14.11	40	1.41
500	17.64	50	1.76
600	21.16	60	2.12
700	24.70	70	2.47
800	28.22	80	2.92
900	31.75	90	3.17
1000	35.27		

9. 30 grams is equivalent to:

[A] 10.58 oz.
[B] 0.35 oz.
[C] 1.06 oz.
[D] 31.75 oz

10. 150 grams is equivalent to:

[A] 5.29 oz.
[B] 3.53 oz.
[C] 17.99 oz.
[D] 1.76 oz.

TABLE 8

SUMMARIES OF THE VT EVALUATIONS ON KNOWLEDGE OF MATERIALS

1. Teaching and Learning the Metric System. (d. an overview of the contents of the package plus suggestions for using the instructional materials.)

Region*	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	15	21	23	23	17	24	19	22	29	29	222
incorrect	2	0	3	0	2	1	3	6	1	1	19
no answer	0	1	0	0	0	0	0	6	0	0	7
% correct	88	100	88	100	89	96	86	79	97	97	92

2. Unit 1 (e. background information and hands-on exercises for a general introduction to metric measurement.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	16	20	23	17	16	24	18	16	27	28	205
incorrect	1	2	3	4	3	1	4	12	3	2	35
no answer	0	0	0	2	0	0	0	6	0	0	8
% correct	94	91	88	81	84	96	82	57	90	93	85

3. Unit 2 (i. background information, tables, and exercises to introduce the metric units specific to an occupation.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	15	17	21	21	17	19	18	11	24	23	186
incorrect	2	4	5	1	2	6	3	16	6	7	52
no answer	0	1	0	1	0	0	1	7	0	0	10
% correct	88	81	81	95	89	76	86	41	80	77	78

*This refers to the ten USOE Regions. They are given in the order in which workshops were given. The regions, and workshop cities are: IX San Francisco, II New York, III Philadelphia, I Boston, VIII Denver, V Chicago, X Seattle, IV Atlanta, VI Dallas, VII Kansas City.

TABLE 8 (Cont.)

4. Unit 3. (b. background information and exercises on metric-metric equivalents.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	14	18	21	21	12	24	19	17	24	24	194
incorrect	3	3	5	1	7	1	3	10	5	6	44
no answer	0	1	0	1	0	0	0	7	1	0	10
% correct	82	86	81	95	63	96	86	63	83	80	82

5. Unit 4. (c. background information and exercises on selecting and using metric instruments, tools and devices.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	14	15	19	18	13	21	19	24	20	28	191
incorrect	3	7	7	3	6	4	3	4	10	2	49
no answer	0	0	0	2	0	0	0	6	0	0	8
% correct	82	68	70	86	68	84	86	86	67	93	80

6. Unit 5. (h. background information, conversion formulae and charts for metric-customary conversion.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	14	21	22	20	12	24	19	20	25	29	206
incorrect	3	1	4	2	7	0	3	8	5	1	34
no answer	0	0	0	1	0	1	0	6	0	0	8
% correct	82	95	85	91	63	100	86	71	83	97	83

TABLE 8 (Cont.)

7. Testing Metric Abilities (f. test items to be used with each unit.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	15	18	23	20	17	24	21	25	29	29	221
incorrect	2	1	2	3	2	0	1	4	1	1	17
no answer	0	3	1	0	0	1	0	5	0	0	10
% correct	88	94	92	87	89	100	95	86	97	97	93

8. Answers to Exercises and Test (a. answers to student exercises and "Testing Metric Abilities".)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	16	19	23	21	18	24	21	24	29	29	224
incorrect	1	1	3	2	0	0	0	4	1	1	13
no answer	0	2	0	0	1	1	1	6	0	0	11
% correct	88	95	88	91	100	100	100	86	97	97	94

9. Tools and Devices List (j. a list of tools and devices used to set up resource tables and those metric tools and devices particular to an occupation.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	15	18	23	21	14	22	22	27	26	29	217
incorrect	2	3	3	2	5	2	0	2	3	1	23
no answer	0	1	0	0	0	1	0	5	1	0	8
% correct	88	86	88	91	74	92	100	93	89	97	90

TABLE 8 (Cont.)

10. References (a. selected annotated references of written materials, metric suppliers, and information sources.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	16	20	24	22	17	24	21	28	30	30	232
Incorrect	1	1	1	1	2	0	1	1	0	0	9
no answer	0	1	0	0	0	1	0	5	0	0	7
% correct	94	95	92	96	89	100	95	97	100	100	96

Totals for all 10 items

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	170	220	260	230	190	250	220	340	300	300	2480
correct	150	187	222	204	153	230	197	214	263	278	2098
Incorrect	20	23	37	19	36	15	21	67	35	22	295
no answer	0	10	1	7	1	5	2	59	2	0	87
% correct	88	89	86	91	81	94	90	76	88	93	88

Metric Abilities, Answers to Exercises and Test, List of Tools and Devices, and References) plus the five instructional units (simply entitled Unit 1 through Unit 5). The participants were asked to match the title of the item with an explanation of its contents. The items dealing with teacher support materials had the highest percentage of correct responses. This is not unexpected since the explanations of those materials often contained the same words as the title, or the title was self-explanatory. The participants were best able to identify the contents of the units in the following order: Unit 1, Unit 5, Unit 3, Unit 4, and Unit 2. During the hands-on activities each person had one of the V-T booklets and followed the directions for the hands-on activities given in Unit 1. Thus, participants should have been very familiar with the content of Unit 1. They got Unit 1 correct 85.4% of the time.

Unit 4 dealt with tools and devices. This was most often confused with the section entitled "List of Tools and Devices," and as a result, was often incorrectly identified. However, the nature of the errors indicates that participants were cognizant that the unit did contain information concerning tools and devices and were not just guessing. Participants got this item correct 79.9% of the time.

The most confusing result is that Unit 2, the unit that is concerned with occupationally specific metric terms, was the item most often incorrectly identified. This item was answered correctly by 78.2% of the participants. About 1½ - 2 hours were spent in each workshop on Unit 2. This was about the same amount of time as was spent on Unit 1. One possible explanation for the lower results for Unit 2 is that the activities engaged in during this session dealt with how to develop unique packages. Thus, the participants learned a valuable curriculum development process but did not necessarily make the connection with the contents actually presented in this unit.

The second part of the V-T evaluation was to determine the metric knowledge of the participants at the conclusion of the workshop. As with the ABE section, these results might have been more valuable and meaningful had some measure of participants' metric knowledge been taken prior to the advent of the workshop. The metric knowledge test consisted of ten multiple-choice items. Results of the post-test over participants' metric knowledge are given in Table 9. Overall, participants got 92.4% of the metric items correct.

The three items dealing with choosing an appropriate measuring device and reading a conversion chart (Items 7, 9, and 10) were most often answered correctly. Participants were asked to select the correct instrument for measuring degrees Celsius. The correct response, thermometer, was very familiar to the participants. Thus, it is no surprise that 98.4% of the participants selected the correct response. Or to put it another way, only four people of the 245 that completed this item answered it incorrectly. Only five people missed one of the conversion chart questions; 11 missed the other.

The questions dealing with metric-metric equivalents (Items 5 and 6) were the most often missed. This section deals with a mathematical skill which teachers, as well as students, sometimes find confusing. However, 84% of all participants answered these questions correctly. The Seattle workshop produced the best results with 95% of the items marked correctly. The presentation in Seattle followed the format in the V-T materials very closely and included a series of short presentations, practice exercises, and immediate feedback. This process produced good immediate results.

Table 10 contains the number of correct and incorrect answers on the total V-T evaluation for each workshop. The Region IV workshop held in Atlanta received the lowest scores for both parts of the V-T evaluation.

TABLE 9

SUMMARIES OF THE VT EVALUATIONS ON KNOWLEDGE OF METRIC SYSTEM

1. The correct way to write 20 centimetres is: (A. 20 cm)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	13	19	21	21	18	24	22	31	28	29	226
Incorrect	3	1	5	2	1	0	0	3	2	1	18
no answer	1	2	0	0	0	1	0	0	0	0	4
% correct	81	95	81	91	95	100	100	91	93	97	93

2. Estimate the length of the line segment below: (B. 6 centimetres)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	13	20	25	21	19	23	22	22	28	28	221
Incorrect	3	1	1	1	0	1	0	11	2	2	22
no answer	1	1	0	1	0	1	0	1	0	0	5
% correct	81	95	96	95	100	96	100	67	93	93	91

3. A square metre is about the area of: (B. a card table top)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	15	19	25	21	17	22	22	28	29	30	228
Incorrect	1	1	1	2	2	2	0	5	1	0	15
no answer	1	2	0	0	0	1	0	1	0	0	5
% correct	94	95	96	91	89	92	100	85	97	100	94

TABLE 9 (Cont.)

4. The mass of an adult will be measured in: (C. kilograms)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	16	21	24	22	16	23	22	27	26	29	226
incorrect	0	0	1	1	3	1	0	7	4	1	18
no answer	1	1	1	0	0	1	0	0	0	0	4
% correct	100	100	96	96	84	96	100	79	87	97	93

5. 112 centimetres is the same as: (D. 1.12 metres)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	12	19	22	21	15	21	21	24	27	29	211
incorrect	4	2	4	2	4	3	1	9	3	1	33
no answer	1	1	0	0	0	1	0	1	0	0	4
% correct	75	90	85	91	79	88	95	73	90	97	86

6. 0.5 litre is the same as: (B. 500 ml)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	12	16	24	21	13	18	21	26	25	26	202
incorrect	3	3	2	2	6	6	1	7	5	4	39
no answer	2	3	0	0	0	1	0	1	0	0	7
% correct	80	84	92	91	63	75	95	79	83	87	84

TABLE 9 (Cont.)

7. Degrees Celsius are measured with a: (A. thermometer)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	16	21	25	23	19	24	22	31	30	30	241
incorrect	0	0	1	0	0	0	0	3	0	0	4
no answer	1	1	0	0	0	1	0	0	0	0	3
% correct	100	100	96	100	100	100	100	91	100	100	98

8. The replacement unit for the fluid ounce is the: (D. millilitre)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	15	21	25	21	18	21	20	26	28	29	224
incorrect	1	0	1	2	1	3	2	8	2	1	21
no answer	1	1	0	0	0	1	0	0	0	0	3
% correct	94	100	96	91	95	88	91	76	93	97	91

9. 30 grams is equivalent to: (C. 1.06 oz.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	15	21	23	23	16	24	20	32	30	28	232
incorrect	1	0	3	0	2	0	2	1	0	2	11
no answer	1	1	0	0	1	1	0	1	0	0	5
% correct	94	100	88	100	89	100	91	97	100	93	95

TABLE 9 (Cont.)

10. 150 grams is equivalent to: (A. 5.29 oz.)

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	17	22	26	23	19	25	22	34	30	30	248
correct	16	21	26	23	18	24	21	30	30	29	238
incorrect	0	0	0	0	0	0	1	3	0	1	5
no answer	1	1	0	0	1	1	0	1	0	0	5
% correct	100	100	100	100	100	100	95	91	100	97	98

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total
n	170	220	260	230	190	250	220	340	300	300	2480
correct	143	198	240	217	169	224	213	277	281	287	2249
incorrect	16	8	19	12	19	16	7	57	19	13	186
no answer	11	14	1	1	2	10	0	6	0	0	45
% correct	90	96	93	95	90	93	97	83	94	96	92

TABLE 10

NUMBER AND PERCENT CORRECT ON TOTAL VT EVALUATIONS BY WORKSHOP AND OVERALL

Region	IX	II	III	I	VIII	V	X	IV	VI	VII	TOTAL
n	340	440	520	460	380	500	440	680	600	600	4960
correct	293	385	462	421	322	454	410	491	544	565	4347
incorrect	36	31	56	31	55	31	28	124	54	35	481
no answer	11	24	2	8	3	15	2	65	2	0	132
% correct	89	92	89	93	85	94	94	80	91	94	90

There were some special circumstances that affected these scores. Atlanta was the first workshop to use the revised agenda. In Atlanta, work on the packages was given both days, and the V-T evaluation was administered on the second day at the end of the workshop, instead of at the end of the first day. The additional time that was used to review the packages and work with the materials should have resulted in higher scores. However, the V-T evaluation and the overall workshop evaluation were distributed together at the end of the second day's session. Many participants seemed in a hurry to leave, and either did not do the evaluation, or finished it very quickly. The result was that the participants scored five percentage points lower on the content of the packages and seven percentage points lower on knowledge of basic metric concepts than the next lowest scores from any other workshop.

The range of scores for the other nine workshops was 13 percentage points (81-94%) for content of the packages, and seven percentage points (90-97%) for knowledge of the metric system. Given the generally high scores and the narrow range of scores, it is difficult to determine whether the staff made a significantly better presentation at any one workshop. Chicago (94%), Seattle (94%), and Kansas City (94%) had the highest overall percentages. Atlanta (83%), Denver (85%), and San Francisco (89%) had the lowest overall percentages. The other four workshops were all within two percentage points of each other.

At the conclusion of each workshop, an overall evaluation was completed by the participants (Figure 8). The first six questions were meant to cover the complete workshop. The last nine questions were concerned with the specific session (V-T or ABE) that the participant attended. Reports were filed after each workshop giving detailed responses and all comments for each workshop. Table 11 contains the averages of the responses of the

TABLE 11
SUMMARIES OF OVERALL EVALUATION BY VT PARTICIPANTS

USOE Region	IX	II	III	I	VIII	V	X	IV	VI	VII	Total Avg.
Number of VT participants completing evaluation	17	21	25	18	16	25	25	34	28	31	240
1. Workshop information (4.00=perfect score)	2.87	3.26	3.40	3.11	3.12	3.21	3.44	3.41	3.71	3.29	3.32
2. Registration procedures	2.00	2.68	3.08	3.00	2.67	2.65	2.93	3.44	3.57	2.77	2.94
3. Meeting Rooms	2.81	3.29	3.28	2.22	3.81	2.72	3.52	3.50	2.64	2.68	3.03
4. Overall Organization	2.53	3.15	3.48	3.06	3.25	2.84	3.29	3.03	3.18	3.00	3.09
5. Opening Comments	2.87	3.22	3.21	3.00	3.20	2.78	3.09	3.15	3.41	3.29	3.10
6. Closing Comments	3.06	2.93	3.10	2.93	3.00	2.38	3.05	3.00	3.21	2.92	2.99
7. Content	2.94	3.00	3.27	3.22	3.27	3.25	3.42	3.39	3.50	3.24	3.29
8. Instruction	2.60	2.63	3.23	3.05	3.00	2.67	3.08	3.18	3.14	2.86	2.96
9. Instructors	3.06	3.15	3.30	3.41	3.20	3.21	3.67	3.57	3.33	3.23	3.37
10. Printed Inst. Materials	3.65	3.20	3.30	3.50	3.47	3.42	3.75	3.55	3.75	3.52	3.53
11. Professional Interaction	3.50	3.50	3.30	3.72	3.67	3.28	3.25	3.43	3.75	3.48	3.49
12. Session as a Whole	3.06	2.95	3.40	3.28	3.25	3.00	3.46	3.24	3.61	3.26	3.25
13. Expectations met (1.00=perfect score)	2.53	2.45	2.32	1.94	2.25	2.21	1.90	2.12	1.52	2.13	2.13
14a Instruction: Technical (3.00=Just right)	3.29	3.20	2.84	3.50	3.19	3.24	3.27	3.21	3.00	3.24	3.21
14b Instruction: Formality (3.00=Just right)	2.81	3.24	2.93	3.18	3.00	3.00	2.80	3.07	3.00	2.95	3.00
Total: Ques. 1 - 6 (A)	16.14	18.53	19.55	17.32	19.05	16.58	19.32	19.53	19.72	17.95	18.47
Ques. 7 - 12 (B)	18.81	18.43	19.80	20.18	19.85	18.83	20.63	20.36	21.08	19.59	19.89
B - A	1.17	0.99	1.01	1.17	1.04	1.14	1.07	1.04	1.07	1.09	1.08

133

V-T participants for each question by workshop, and by the total of the ten workshops. The lowest results were for registration procedures and for instruction.

Criticism of the registration procedures were discussed in the ABE section of this report. Prior to the Seattle workshop, folders of materials were distributed with a blank name tag attached. Beginning with the Seattle workshop, names of all participants who had been invited and who had either indicated that they intended to attend or had not returned the pre-registration postcard, were typed on name tags that were attached to folders. In Seattle these were arranged alphabetically and grouped by states. This slowed on-site registration and folders were arranged solely in alphabetical order for the last three workshops. There was some confusion with the Kansas City workshop. Some of the participants were mailed invitations to the Seattle workshop. However, this was discovered and corrected three months before the workshop in Kansas City. The registration procedures were evaluated much lower in the Kansas City workshop than in the previous three.

The only other item that had a lower average rating was the V-T instruction. It is interesting to note that the average rating for the first seven workshops was 2.97 and for the last three, with the revised format, it was 2.95. Thus, there was no apparent increase in the rating for instruction of the V-T sessions with the revised format. (Remember that there was a marked improvement in the rating in the ABE sessions.) Yet the V-T instructional staff had more positive feelings about the last three workshops than they did about the first seven.

The V-T instructional materials received very high ratings. Overall, for all ten workshops, the V-T materials received a rating of 3.53. The highest ratings were at Seattle and Dallas where they got a 3.75. The lowest rating was at the New York workshop (3.20), the same workshop where the

ABE materials received the lowest rating.

What was the most effective workshop? As was pointed out in the remarks about the ABE sessions, there are several different ways of determining this. One method is to look at question 12. This question gave the rating of the session as a whole. Using this criteria, the workshops that received the four highest ratings, in order, were Dallas, Seattle, Philadelphia, and Boston.

The second method is by adding the ratings for questions 7 through 12. These six questions all dealt with the curriculum and instruction of the workshops. These sums, from Table 11, make the four highest workshops, from highest to lowest, Dallas, Seattle, Atlanta, and Boston.

The third method is to divide the sum of the ratings for questions 7 through 12 by the sum of the ratings for questions 1 through 6. This attempts to take into account any correlation between questions 1 through 6 and the latter six questions. These ratios are given in Table 10. Using this method, the four highest workshop ratings, in order, were San Francisco, Boston, Chicago, and Kansas City.

The fourth method is to look at the percent of items that participants got correct on the questions concerning their knowledge of the V-T materials. Ranked in order, the four highest workshops were Chicago, Kansas City, Boston, and Seattle.

The fifth, and final, method is to determine the ranking of each workshop on each of four parts: knowledge of materials, knowledge of the metric system, the sum of questions 1-6, and the sum of questions 7-12. By adding the rank of each workshop (see Table 12) on each of these four parts and then ranking these sums, a combined ranking is determined. With this method, the four best workshops were Seattle, Dallas, Kansas City, and Philadelphia.

TABLE 12

RANKING OF WORKSHOPS ON KNOWLEDGE OF VT MATERIALS, KNOWLEDGE OF METRIC SYSTEM, AND OVERALL EVALUATIONS FOR VT SESSIONS

Workshop		Knowledge of Material		Knowledge of Metrics		Overall Evaluation				Totals	
City	Region	%	Rank	%	Rank	Ques 1 - 6		Ques 7 - 12		Sum of Ranks	Final Rank
						Total	Rank	Total	Rank		
San Francisco	IX	88	6	90	8	16.14	10	18.81	9	33	10
New York	II	89	5	96	2	18.53	6	18.43	10	23	6
Philadelphia	III	86	8	93	6	19.55	2	19.80	6	22	5
Boston	I	91	3	95	4	17.32	8	20.18	4	19	4
Denver	VIII	81	9	90	8	19.05	5	19.85	5	27	9
Chicago	V	94	1	93	6	16.58	9	18.83	8	24	7
Seattle	X	90	4	97	1	19.32	4	20.63	2	11	1
Atlanta	IV	76	10	83	10	19.53	3	20.36	3	26	8
Dallas	VI	88	6	94	5	19.72	1	21.08	1	13	2
Kansas City	VII	93	2	96	2	17.95	7	19.59	7	18	3

Two cities appear in four of these five methods for ranking the workshops. These two workshops are Boston, and Seattle. Dallas and Kansas City, the last two workshops, appear among the top four workshops on three of the methods. This seems to indicate that the V-T workshops progressively improved.

Recommendations

The following recommendations are based on several factors. Some are based on the evaluations--specifically, the comments of the participants. Others are based on unrecorded comments to workshop staff by participants, and on the staffs' impressions while conducting the workshops. Some of these recommendations are meant to reinforce procedures that were followed during some of the workshops.

Recommendation 1: Select workshop sites and dates far in advance. Many aspects contribute to a successful workshop. One of the most important of these is to have enough time to publicize the workshop and select participants. Some publications which will promote workshops require at least three months advance notice before the requested printing date. A minimum of four months should be allowed between the selection of the workshop sites and dates and the beginning of the first workshop.

Recommendation 2: Send workshop publicity as soon as possible after sites and dates have been selected. Publicity should include the usual information about who is conducting the workshop, where, when, the purpose of the workshop, how a person should register, and the registration deadline. Addenda might include a project history, description of project products, etc.

Recommendation 3: Clearly outline all procedures for registration and/or requests for information. Any request for action should be in the

first or second paragraph. Make clear who are wanted as participants (state department, RCU, curriculum lab personnel, teacher educators, local administrators, local teachers.) Specify who to contact in order to register. Specify any deadline dates for pre-registration.

Recommendation 4: Send an acceptance letter, and workshop and project information to all participants. The letter should include the workshop location and dates, hotel information (special rates, reservation information, etc.) workshop agendas, brochures or information sheets describing the project, project products, and workshop staff, brochure on CVE, and names and locations of rooms where workshop will be conducted (or where registration will be held), and a registration return card.

Recommendation 5: Carefully prepare agenda. If the workshop is to begin at 9:00 then registration should be earlier, say, from 8:30-9:00. Allow several opportunities for participants to get out of their seats and move around--e.g., coffee breaks, changing rooms, forming into different groups. Participants should be alerted to the fact that the actual content, or order of presentation, of the agenda may be changed based on evaluations of earlier workshops, but the starting and ending times would remain the same.

Recommendation 6: Make sure that rooms are ample. A meeting room that will accommodate 30 people in a classroom situation is not large enough if participants are to be out of their seats working at various activities. The best rooms for the metric workshops were rooms that were designed to hold $2\frac{1}{2}$ - 3 times as many people in a classroom situation as were expected to attend the workshop. This meant that participants could work at the hands-on metric activities and not feel cramped for space.

Recommendation 7: Streamline on-site registration. Prepare as much registration material as possible prior to the on-site registration. Have

workshop folders prepared with a pre-labeled name tag for each person who has pre-registered. Check off names of all pre-registrants as they arrive, but do not have them complete another registration card or sign in. Any participant who was not pre-registered should complete a registration card. Any changes in the agenda should be distributed at this time, either by including them in the workshop packet or by handing them to participants.

Recommendation 8: Describe contents of workshop packet. During the introductory remarks a deliberate effort should be made to describe the contents of the workshop packets. Some of the information in the packets will not be needed during the workshop--but participants should know that it is there. Some of the information needs some explanation as to the reason it is included in the materials, its possible use, etc.

Recommendation 9: Have enough supplies. If this is indeed a workshop, then participants will be expected to do some work. What supplies will they need? Try to have a sufficient quantity of supplies, particularly such things as overhead projector transparencies, pens for use on the overhead projector, grease pencils, magic markers, tape, and paper.

Recommendation 10: Make evaluations clear and often. Evaluate the progress of the workshop each day. Do not always wait until the end of the day to evaluate. Participants are tired by the end of the day and often will not give an evaluation time and careful thought. If separate workshop sessions or personnel are to be evaluated, make it very clear what they are to evaluate. In these workshops, evaluation questions about the closing remarks were very often not effective because participants were not sure if the closing remarks to be evaluated were at the close of the workshop or at the close of their (ABE or V-T) session. Again, in evaluating opening remarks, they did not know whether to include welcoming remarks by Assistant Regional Commissioners, the workshop director, or both. If possible, match sections of the evaluation

with the agenda. Distinguish between various parts of the same task. For example, ask one question about pre-registration and another about on-site registration.

Recommendation 11: Provide a staff-participant ratio of 1:15 in workshops requiring personal interaction with staff members. Learners, whatever their status, need continuous feedback and reinforcement. The lack of success of programmed instruction would seem to indicate that personal intervention is a necessary ingredient in the reinforcement process. A staff person can recognize when participants need a cue on how to approach a problem. If the staff-participant ratio is too large, staff members are unable to provide close enough observation.

In addition, workshops with diverse audiences need different sections specifically designed to accommodate different skills and interest levels. Staffing should be sufficient to provide the needed variety.

Recommendation 12: Give a pre-test and post-test in order to gauge the effectiveness of the workshop instruction. If, for example, one of the workshop objectives was to give participants some instruction in the metric system, then determine their level of knowledge before and after the metric instruction. Additionally, it is possible that some participants may have an in-depth knowledge of one factor of the workshop, and if the pre-test confirms this, then some other constructive activities should be planned for those participants.

Recommendation 13: Invite more people than you expect to attend. Try to get some ideas from other workshops on the percent of returns that were received for the number of invitations extended. Also, give due consideration to whether invitees should be recommended by a superior (as was the case for these workshops), or would a general invitation extended to anyone in the field gain a larger number of participants.

X DEVELOPMENT OF AN IMPLEMENTATION GUIDE

The final task consisted of the preparation of "a guide for implementing metric measurement in vocational education and basic adult education."

Activities

A part of the workshop activities addressed implementation and dissemination strategies. A synthesis was made of these outputs and incorporated in the Implementation Guide.

1. The second day of each workshop was committed to the specification of implementation needs by each state and recommended strategies for implementation.
2. This data was analyzed and findings were incorporated in the design and writing of the Implementation Guide.
3. Implementation Guide was submitted to sponsor for approval.
4. Twenty-five copies of the final version will have been submitted to the sponsor at the close of the project.
5. The guide will be submitted to ERIC for inclusion in their data base.

Problems

A problem inherent in the nature of the project is the enormous diversity of target audiences addressed. Such diversity makes it difficult to develop concise, easily-describable strategies in a manner to hold the interest of all readers. Another problem is that only 25 copies are being delivered to the sponsor, so that the ultimate user is not likely to ever see it unless he or she finds it in ERIC.

Recommendations

1. We recommend that all products of a project of this nature be printed

in sufficient number to reach the local practitioner and that funding be provided to assure this outcome.

2. An Implementation Guide should be validated through a field-trial, and we recommend that future projects be given the time and funds to conduct such an activity.

APPENDIX I-A

List of Metric Instructional Packages

VOCATIONAL-TECHNICAL METRIC INSTRUCTIONAL PACKAGES

AGRI-BUSINESS AND NATURAL RESOURCES

Agricultural Mechanics
Agricultural Supplies &
Services, Agricultural
Production (2)
Forestry
Horticulture

ARTS AND HUMANITIES

Assistant Theatre Manager
Broadcast Announcing
Stage Lighting Technology
Technical Theatre Assistant
Theatrical Costuming

BUSINESS AND OFFICE

General Office Clerks,
Clerk-Typists, Typists (3)
Key Punch Operator
Secretarial, Stenography (2)

COMMUNICATION MEDIA

Architectural, Civil,
Mechanical Drafting (3)
Bindery Operation
Commercial Photography
Copy Preparation, Layout and
Design, Type Composition (3)
Litho Photography, Offset Stripping,
Offset Platemaking (3)
Offset Printing Press Operation

CONSTRUCTION

Air Conditioning & Refrigeration,
Heating, Ventilating (3)
Commercial, Industrial,
Residential Electricity (3)
Plumbing, Pipefitting (2)

ENVIRONMENTAL CONTROL

Wastewater Technology

HEALTH OCCUPATIONS

Dental Assistants
Dietetic Technicians
Licensed Practical Nursing
Nurses Aides
Nursing (RN)

HOME ECONOMICS

Alterations Specialists &
Tailoring (2)
Child Care Aides
Food Preparation, Baking,
Meat Cutting (3)
Homemaker and Health Aides
Interior Design Assistants

HOSPITALITY AND RECREATION

Food Services
Hotel and Lodging
Recreation and Tourism

MANUFACTURING

Blueprint Reading
Industrial Electronics,
Radio-T.V. Repair, Audio
Equipment Repair (3)
Metal Patternmaking
Numerical Control Operators
Sheet Metal Working
Small Appliance Repair,
Major Appliance Repair (2)
Tool and Die Making
Welding and Cutting

MARKETING AND DISTRIBUTION

Automotive Merchandising,
Petroleum Marketing (2)
Food Distribution
Hard Goods Merchandising
Soft Goods Merchandising
Transportation

PERSONAL SERVICES

Cosmetology

PUBLIC SERVICE

Fire Service
Law Enforcement

TRANSPORTATION

Auto Mechanics
Aviation Electronics
Diesel Mechanics
Small Engine Repair

BASIC EDUCATION METRIC PACKAGES

"METRICS FOR GOOD MEASURE"

LEVEL I

For students with reading
and mathematical abilities
at Grade Levels 1-2

Student Workbook
3 Audio Tapes
Instructor's Guide
Audio Tape Script

LEVEL II

For students with reading
and mathematical abilities
at Grade Levels 4-6.

Student Workbook
Instructor's Guide

LEVEL III

For students with reading
and mathematical abilities
at Grade Levels 7-9

Student Workbook
Instructor's Guide

APPENDIX I-B

Follow-up Study for Recommendations

METRIC PROJECT FOLLOW-UP STUDY

In order to help determine the impact of this project four audiences need to be addressed: (1) the state directors of vocational education, (2) the state directors of adult education, (3) people who attended the ten in-service workshops, and (4) The Center for Vocational Education. Information should be gathered from these people in June 1978.

The same information would be gathered from the first two audiences. A simple return postcard could be filled out by each of the state directors of vocational education and state directors of adult education. Sample postcards are shown below.

(Sample Postcard to State Directors of Vocational Education)

During May or June, 1977, you received complete sets of the 55 metric packages for 77 vocational program areas. The metric packages were developed at The Center for Vocational Education. You were encouraged to reproduce these materials for personnel within your state.

How many people have requested copies of these materials? _____

How many copies have been produced? _____

List the ten packages that had the most copies reproduced and the number of copies that were reproduced.

Package Name

Number of Copies

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

A similar card would be used with the state directors of adult education.

(Sample Postcard to State Directors of Adult Education)

During May or June, 1977, you received one complete set of Adult Basic Education metric materials. These ABE materials were in three levels: Level I, Grades 1-3; Level II, Grades 4-6; and Level III, Grades 7-9. The materials were developed at The Center for Vocational Education. You were encouraged to reproduce these materials for personnel within your state.

How many people have requested copies of these materials? _____

How many copies of each of the following have been reproduced? _____

Level I, Student Workbook _____
 Level I, Instructor's Guide _____
 Level I, Audio Tape Script _____
 Level I, Audio Tapes _____
 Level II, Student Workbook _____
 Level II, Instructor's Guide _____
 Level III, Student Workbook _____
 Level III, Instructor's Guide _____

A complete list of people who attended the workshop is given in Appendix VIII-E. Attached is a copy of a follow-up letter, directions for completing the follow-up letter, and a sample of a questionnaire to accompany the letter. A copy of the letter and questionnaire should be sent to each workshop participant.

Tabulation of responses should include the number of teachers and students who are using the materials, the number and percentage of respondents who have conducted workshops using the CVE metric materials, the number of people at each workshop, the length of each workshop, and the program areas and positions of people attending the workshops.

A questionnaire should be sent to The Center for Vocational Education requesting the number of inquiries received regarding the metric project products, and inquiries about conducting metric workshops using the CVE materials.

Approximately one year ago you attended a Metric In-service Workshop for vocational, technical, and adult educators. The workshop was held at the

and was sponsored by The Center for Vocational Education, The Ohio State University.

The primary goal of the workshop was to help each state or territory develop its own capability to train teachers in the use of the 55 vocational metric packages or the ABE metric materials. In order to help determine the effectiveness of these workshops, we would like you to complete the enclosed evaluation instrument and return it in the envelope provided. Yours comments will help us design better workshops.

Sincerely,

Mary Marks, Chief
Curriculum Branch

Directions for Completing Follow-Up Letter

If the letter is
being mailed to
a state in Region

Insert the following in Paragraph 1

I	Bristol Community College in Fall River, Massachusetts
II	City University Graduate School in New York City
III	Philadelphia Hilton Inn in Philadelphia
IV	Sheraton-Biltmore Hotel in Atlanta
V	Bismarck Hotel in Chicago
VI	Dunfee's Royal Coach Inn in Dallas
VII	Continental Hotel in Kansas City
VIII	Cosmopolitan Hotel in Denver
IX	Holiday Inn Civic Center in San Francisco
X	Olympic Hotel in Seattle

Which section of the workshop did you attend? ABE _____

V-T _____

How many people in your state are using The Center for Vocational Education's metric materials? What vocational program areas or ABE levels are being used? Answer these two questions by completing the table below.

Vocational Program Area or ABE Level	Number of Teachers	Number of Students

Have you conducted any workshops using the Center for Vocational Education's metric materials? _____

If no, why not? _____

If yes, please complete the remainder of this questionnaire. For each workshop that you have conducted using the Center for Vocational Education's metric materials, give the date of the workshop, the types of people that attended (high school home economics, Level I ABE, etc.), the number of people attending the workshop, and the length (in hours) of the workshop.

Date	Type of People	Number Attending	Length of Workshop (hrs.)

APPENDIX II-A

Form Letters Format

The Development and Utilization of Metric Education Instructional Materials in Adult, Vocational, and Technical Education, a USOE-sponsored project, is underway! Intensive project activities over the next three years will result in:

1. An annotated bibliography
2. A position paper
3. Instructional materials in adult education and in 75 occupational areas (grades 10-14)
4. An inservice training workshop for adult and vocational education teachers
5. A comprehensive implementation guide

Our initial task is to identify the materials available from all sources for our annotated bibliography. These materials will be for the use of teachers and students.

You are probably in touch with metric education activities in your professional area. We are asking your help in identifying both metric materials and metric resource people. Please send us copies of

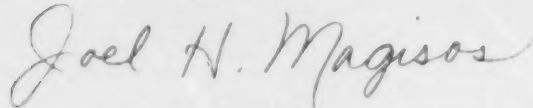
materials or refer us to appropriate persons. Your assistance will contribute to the development of better adult and vocational education metric instructional materials.

We thank you for taking time to identify metric education efforts and resource persons in your area.

Sincerely yours,



Gloria S. Cooper
Co-Director
Metric Education



Joel H. Magisos
Co-Director
Metric Education

GSC/alz

The Development and Utilization of Metric Education Instructional Materials in Vocational, Technical, and Adult Education, a USOE-sponsored project, is underway! Intensive project activities over the next three years will result in:

1. An annotated bibliography
2. A position paper
3. Instructional materials in 75 occupational areas (grades 10-14) and in adult education
4. An inservice training workshop for vocational and adult education teachers
5. A comprehensive implementation guide

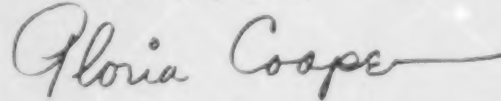
Our initial task is to identify the materials available from all sources for our annotated bibliography. These materials will be for the use of teachers and students.

You are probably in touch with metric education activities in your professional area. We are asking your help in identifying both metric materials and metric resource people. Please send us copies of

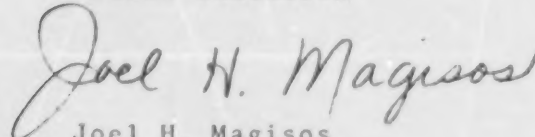
materials or refer us to appropriate persons. Your assistance will contribute to the development of better vocational and adult education metric instructional materials.

We thank you for taking time to identify metric education efforts and resource persons in your area.

Sincerely yours,



Gloria S. Cooper
Co-Director
Metric Education



Joel H. Magisos
Co-Director
Metric Education

GSC/blz

APPENDIX II-B

Work Form for Processing Materials

METRIC EDUCATION BIBLIOGRAPHY WORKFORM



THE CENTER FOR VOCATIONAL EDUCATION

The Ohio State University • 1960 Kenny Road • Columbus, Ohio 43210

ACCESSION NO.

OTHER NO.

SIGN OFF

☐ Reject
☐ Select
☐ Describe
☐ Edit
☐ Type

SELECTION CRITERIA

☐ Scope
☐ Technical Accuracy
☐ Availability
☐ Product Quality
☐ Stereotyping
☐ Other

EDUCATIONAL LEVEL

☐ Secondary
☐ Post-secondary
☐ Adult
☐ Teacher Education
☐ Other

TYPE OF MATERIAL

☐ AV Media
☐ Texts, Student
☐ Guides, Teacher
☐ Other Media
☐ Reference Material

OCCUPATIONAL CLUSTER

- 01 Agriculture, Business & Natural Resources
- 02 Business & Office
- 03 Communications & Media
- 04 Construction
- 05 Consumer & Homemaking Related
- 06 Environmental Control
- 07 Fine Arts & Humanities
- 08 Health Services
- 09 Hospitality & Recreation
- 10 Manufacturing
- 11 Marine Science
- 12 Marketing & Distribution
- 13 Personal Services
- 14 Public Services
- 15 Transportation
- 16 Adult Education
- 17 Metric Education

ANNOTATION OUTLINE

Description

Time required
 Type of material
 Metric concept
 Educational level
 Occupation
 Standards cited

Usage

Learning methods
 Testing methods
 Supplementary materials required
 Prerequisites

Other Information

Metric education strategy
 Field testing or validation

ANNOTATION

APPENDIX II-C

Evaluation Checklist
For
Metric Education - An Annotated Bibliography
Vocational, Technical, and Adult Education

Evaluation Checklist for

METRIC EDUCATION - An Annotated Bibliography for
Vocational, Technical, and Adult Education

This bibliography is targeted for teachers of vocational-technical education, grades 10-14, and for adult education teachers. It was designed to be responsive to the chronic problems faced by teachers, such as limited preparation and reading time, lack of space, limited equipment and dollar resources. The citations are intended to provide the kinds of information which would permit a teacher to evaluate the materials from the perspective of their own facilities and resources.

Given the constraints under which many vocational, technical, and adult education teachers must operate, we felt that a bibliography useful to teachers should meet the ten objectives listed on the following pages.

Each objective is followed by a rating system of 0 through 4, where 0 means "we did not meet the objective at all" and 4 means "we meet the objective completely." We are asking you to rate the adequacy with which we have met our objectives.

We request that you provide us with specific suggestions or criticisms if in your opinion a rating is 0 or 1 in the space marked "Comments."

The last page is a blank sheet available to you if you have any additional comments you would like to make.

1. The bibliography will be targeted for vocational-technical teachers of grades 10-14, and for adult basic education teachers.

Comments _____

2. The bibliography will capture available metric materials which relate to teacher needs.

Comments _____

3. The bibliography will provide a single source to identify materials which meet the metric education needs of teachers and students.

Comments _____

4. Given a 60-word annotation, the citations will provide sufficient information to assist the teacher to select materials to preview.

Comments _____

0	1	2	3	4

5. The citations will provide sufficient information to assist the teacher to order materials.

Comments _____

6. The bibliography will provide resource lists to extend the teachers's ability to identify additional materials, resource persons, related agencies, and periodicals.

Comments _____

7. The metric terminology used within annotations will be consistent with the International System of Units (SI).

Comments _____

8. The organization of the bibliography will make it easy to access for vocational, technical, and adult education teachers.

Comments _____

0	1	2	3	4

9. The bibliography will be segmented into small self-explanatory categories for easy browsing.

Comments _____

10. There will be a quick reference index by the fifteen occupational clusters for those materials amenable to such indexing.

Comments _____

0	1	2	3	4

ADDITIONAL COMMENTS

APPENDIX II-D

ABE Matrix for Bibliography

TEACHING MATERIALS							
Instructional Aids	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
Self-instructional Materials	26	27	28	29	30	31	32
	33	34	35	36	37	38	39
	40	41	42	43	44	45	46
	47	48	49	50	51	52	53
Teacher/Student Materials	54	55	56	57	58	59	60
	61	62	63	64	65	66	67
Flims							
Videocassettes							
Slidefilms							
Transparencies, Transparency Masters, 35 mm slides							
Audio-Recordings							
Multimedia							
Charts and Posters							
Metric Converters and Devices							

REFERENCE MATERIALS							
General Metrication	276	277	278	279	280	281	282
	283	284	285	286	287	288	289
Impact on Education	290	291	292	293	294	295	296
	297	298	299	300	301	302	303
Metrication of Business and Industry							
Impact on Consumers							
International System of Units (SI)							
Converting Customary Metric Measurement Units							
National and International Standards							
Bibliographies							

APPENDIX II-E

Dissemination Plan for Bibliography

A DISSEMINATION PLAN FOR DEVELOPMENT AND UTILIZATION OF METRIC EDUCATION INSTRUCTIONAL MATERIALS IN VOCATIONAL, TECHNICAL, AND ADULT EDUCATION

The design of a dissemination plan for an educational product must be based upon product characteristics, target audiences, diffusion factors, and available dissemination alternatives. An analysis of these leads to a practical recommendation for dissemination.

Analysis

The following brief analysis of product, audience, and diffusion factors, along with an examination of dissemination alternatives, justifies the recommended dissemination plan which follows.

Product Characteristics

Development and Utilization of Metric Education Instructional Materials In Vocational, Technical, and Adult Education can be described as comprehensive, authoritative, and timely. Each of these characteristics can work for or against adoption by users.

Comprehensive.— The product is comprehensive and complex in the sense that it provides a guide to over 400 items representing different educational levels, occupational clusters, types of materials, and metric concepts. It includes instructional materials, reference materials, and lists of resources. Comprehensiveness is a mixed blessing. Some want to know about everything, but most don't want to deal with what they won't actually use. However, one can't subdivide a product to satisfy the latter without increasing the cost of delivery. The best course seems to be that of emphasizing the virtue of comprehensiveness, while making it easy to use.

Authoritative.— The product is authoritative in the sense that it is the result of screening over 5,000 items in a USOE-sponsored project at a national

center at a major university. While the practitioner may find a federal agency, national center, and major university a bit remote to his practical, everyday concerns; it seems a virtue that might help in the local decision process.

Timely.— During the first year (1975) the product will be timely. After that, its value will decrease rapidly as new instructional and reference materials become available. This factor adds urgency to dissemination and suggests need for update.

Target Audiences

The intended target audiences were in vocational, technical, and adult education. Other audiences may exist in other fields, particularly mathematics and science. By function, users may include:

- Curriculum developers
- Instructional materials specialists
- Teacher educators, university-based
- Inservice training specialists
- Program administrators
- Teachers
- Teacher trainees
- Graduate students

These functionaries may be in any educational field at all levels and in industry or business. The size of the total target audience is unknown and "penetration of the market" can be the only practical test. This elastic market requires a flexible production and distribution scheme.

Diffusion Factors

It is assumed that adoption of a product is by stages (i.e., awareness, interest, evaluation, trial, adoption, or rejection): that adopters fall into

categories (i.e., innovators, early adopters, early majority, late majority, and laggards), and that innovations or products have adoption characteristics (e.g., divisibility, communicability, etc.). From this, it is apparent that different groups must be led through adoption stages at different rates. For this product, concentration on awareness and interest stages and the early majority seems appropriate.

Dissemination Alternatives

Available dissemination alternatives include:

1. Limited duplication in fulfillment of USOE requirement (75 copies).
2. Input to ERIC (announcement in Resources in Education and available on microfiche at 625 locations and on demand from EDRS).
3. Input to AIM/ARM (announcement in AIM/ARM and on AIM/ARM tapes, in microfiche sets as part of ERIC).
4. Commercial publication involving copyright authorization, RFP issuance, publisher selection, agreement negotiation, royalty distribution, and eventual sale as part of publishers product line.
5. Government Printing Office printing involving cost to contractor for initial copies.
6. Cost-recovery printing by GPO and promotion as part of CVE product line in Centergram, special flyer, display.

Recommended Plan

It is recommended that Development and Utilization of Metric Education Instructional Materials in Vocational, Technical, and Adult Education be disseminated in the following fashion:

1. The document be input to ERIC and AIM/ARM.
2. The document be prepared in camera-ready for printing by GPO and

cost-recovery sale by CVE.

3. The 75 copies delivered to USOE be used for administrative purposes (i.e., BOAF use, distribution to other Federal agencies, distribution to key interest groups).

The principal advantage of the scheme will be speed of delivery to users. Cost will be higher because of limited and highly speculative print runs; however, the document will be available in microfiche at 25 cents from EDRS, for free use at 625 locations, and at less than 50 cents per page in EDRS hard copy. USOE's 75 copies will be of higher quality because they will be from the same print run.

Given the timeliness factor and current awareness and interest by innovators and early adapters, this seems the best course. CVE, given a cost-recovery sale opportunity, will be able to consider repackaging alternatives and to revise, update, and reissue later.

APPENDIX IV-A

Vocational-Technical Advisory Committee

LIST OF RECOMMENDATIONS FOR
CONSULTANTS TO THE METRIC EDUCATION PROJECT

OCCUPATION CLUSTER	CONSULTANT
1. Agri-business & Natural Resources	David McClay Professor Dept. of Education 102 Armsby Blvd. University Park, Pennsylvania 10802
2. Marine	Ed Mackin Olympus Res. Corp. Boston, Massachusetts (617) 426-8769
3. Construction	Joe Tokash Texas Ed. Agency (512) 475-6205
4. Manufacturing	John Feirer Western Michigan University Kalamazoo, Michigan
5. Transportation	Ed Petrie Transportation Curriculum Project 85 E. Gay, Room 708 Columbus, OH 43215 (614) 4662484
6. Consumer & Homemaking Education	Helen Goetz, Dept. of Consumer Sc. Univ. of Alabama, P.O. Box 6195 University, Ala. (205) 348-7954
7. Hospitality and Recreation	Richard Almarode Florida State University
8. Communication and Media	Lee Foust, Jr. Oregon State University
9. Marketing & Distribution	Gail Trapnell State Dept. of Education Knott Bldg. Tallahassee, Florida 32304
10. Personal Services	Carol Hodgson Planning & Human Systems, Inc. 4400 Jennifer Street, N.W. Washington, D.C. 20016

OCCUPATION CLUSTER	CONSULTANT
11. Business & Office	Harry Huffman, Dept. of Voc. Ed. Colorado State University 80523 Fort Collins, CO (303) 491-1101
12. Health	Miles H. Anderson UCLA - Allied Health Prof. Project 1003 Wilshire Blvd. Santa Monica, CA 90401
13. Fine Arts & Humanities	Mary Lewis Hansen TERC, 44A Brattle St., Cambridge, MA
14. Public Service	Pat Weagraff State Director, Voc. Ed. 182 Tremont Avenue Boston, MA (617) 547-0430
15. Environmental Control	Bernard Lukco, Environmental Protection Agency, assigned to School of Natural Resources The Ohio State University (614) 422-5589

APPENDIX IV-B

Prototype for Metric Instructional Packages
For
Vocational Education

METRIC EDUCATION for [OCCUPATIONAL AREA]

CONTENTS

Objectives	1	Visuals	9
Teaching & Learning Metrics. . .	2	Student Exercises	13
Metric Learning Activities . . .	3	Testing Metric Abilities . . .	18
Metric Units (Content)	5	Metric References	20

OBJECTIVES

- 1.0 GENERAL OCCUPATIONAL OBJECTIVE
 - 1.1 Enabling Performance Objective
 - 1.2 Enabling Performance Objective
- 2.0 GENERAL OCCUPATIONAL OBJECTIVE
 - 2.1 Enabling Performance Objective
 - 2.2 Enabling Performance Objective
- 3.0 GENERAL OCCUPATIONAL OBJECTIVE
 - 3.1 Enabling Performance Objective
 - 3.2 Enabling Performance Objective
- 4.0 GENERAL OCCUPATIONAL OBJECTIVE
 - 4.1 Enabling Performance Objective
 - 4.2 Enabling Performance Objective
- 5.0 GENERAL OCCUPATIONAL OBJECTIVE
 - 5.1 Enabling Performance Objective
 - 5.2 Enabling Performance Objective



TEACHING AND LEARNING METRICS IN OCCUPATIONAL AREA

Explanation of the organization of the instructional package and suggested strategies for teaching and learning the metric system for use in occupations. Suggestions include --

1. A "think metric" approach
2. Learning the basic core of knowledge
3. Learning specific occupational applications
4. Providing actual experience
5. Practicing skills
6. Testing performance
7. Learning in small increments
8. Maintaining informality to reduce anxiety
9. Progressing through sequences
10. Limiting to essential content
11. Pacing learning to the industry transition

METRIC LEARNING ACTIVITIES

Learning Activity 1.0 (Corresponds with Objective 1.0)

(A sequence of activities designed to help the teacher articulate the content, visuals, student exercises and tests toward the achievement of performance objectives)

Learning Activity 2.0 (Corresponds with Objective 2.0)Learning Activity 3.0 (Corresponds with Objective 3.0)Learning Activity 4.0 (Corresponds with Objective 4.0)Learning Activity 5.0 (Corresponds with Objective 5.0)

METRIC UNITS (CONTENT)

Sections providing concise descriptions of metric units; prefixes; rules of notation; length, area, volume, and mass relationships; selecting and using metric instruments, tools, and devices; and finding metric equivalents. This part is designed as content to be used by the teacher in preparing presentations.

Pages 5-8

VISUALS

Four master visuals are to be provided for use as overhead projection transparencies, student handouts, or as bulletin board displays. They may include --

1. Metric relationships (length, area, volume, mass)
2. Temperature
3. Metric prefixes and decimal values
4. Tables providing specific derivations or equivalencies

STUDENT EXERCISES

EXERCISE 1 (Corresponds with Learning Activity 1.0)

(Suggestions for individual student application
of knowledge to occupationally related problems
and practice of measurement skills)

EXERCISE 2 (Corresponds with Learning Activity 2.0)EXERCISE 3 (Corresponds with Learning Activity 3.0)EXERCISE 4 (Corresponds with Learning Activity 4.0)EXERCISE 5 (Corresponds with Learning Activity 5.0)

TESTING METRIC ABILITIES

Multiple-choice test items are organized in sections corresponding with general occupational objectives (page 1). Each item is keyed to a specific performance objective. These sections and/or items may be used in an end-of-unit test or during the course of the unit.

A few demonstration-of-skill test items are included in the sequence of "Metric Learning Activities" (page 3-4).

REFERENCES

Four or five key references which specifically support the instructional package are listed. Included are the project-generated bibliography and position paper. Consideration is being given to providing the full text in microfiche form.

APPENDIX IV-C

77 Program Areas Selected

METRIC INSTRUCTIONAL PACKAGES UNDER DEVELOPMENT

AGRI-BUSINESS AND NATURAL RESOURCES

Agricultural Supplies/Services
Agricultural Production
Agricultural Mechanics
Horticulture
Forestry

BUSINESS AND OFFICE

Typist
Clerk Typist
General Office Clerk
Stenography
Secretary
Data Processing

ARTS AND HUMANITIES

Broadcast Announcer
Theatrical Costuming
Stage Lighting Technology
Technical Theater Assistant
Assistant Theater Manager

COMMUNICATION MEDIA

Composition
Lay Out and Design
Copy Preparation
Offset Printing Press
Operation
Litho Photography
Offset Stripping
Offset Platemaking
Bindery Operation
Commercial Photography
Architectural Drafting
Civil Drafting
Mechanical Drafting

CONSTRUCTION

Air Conditioning/
Refrigeration
Heating
Ventilating
Plumbing
Pipefitting
Residential Electricity
Industrial Electricity
Commercial Electrician

HOME ECONOMICS

Child Care Aide
Tailoring
Alterations Specialist
Homemaker/Health Aide
Food Preparation
Interior Design Assistant
Baker
Meat Cutting

ENVIRONMENTAL CONTROL

Waste Water Technology

HEALTH OCCUPATIONS

Nurses Aide
Nursing (A.A.)
Licensed Practical Nurse
Dental Assistant
Dietetic Technician

HOSPITALITY AND RECREATION

Recreation/Tourism
Hotel and Lodging
Food Services

MANUFACTURING

Sheet Metal
Welding/Cutting
Tool and Die
N/C Operator
Metal Patternmaking
Blueprint Reading
Industrial Electronics
Small Appliance Repair
Major Appliance Repair
Radio-TV Repair
Audio Equipment Repair

MARKETING AND DISTRIBUTION

Hard Goods Merchandising
Food Distribution
Automotive Merchandising
Petroleum Merchandising
Transportation
Soft Goods Merchandising

PERSONAL SERVICES

Cosmetology

TRANSPORTATION

Small Engine Repair
Diesel Truck Mechanics
Auto Mechanics
Aviation Electronics

PUBLIC SERVICE

Fire Service
Law Enforcement

APPENDIX IV-D

Work Forms for Developing
Vocational Metric Instructional Packages

Measurement Needs Analysis

Name _____

Package

Measurement Tasks

Quantities

Units

L	E	M	*
---	---	---	---

3

Changes in Standards: _____



THE CENTER FOR VOCATIONAL EDUCATION
The CVCE is a non-profit organization, 501(c)(3) entity, established in 1977.

188

METRIC EDUCATION PROJECT

FORM # 2

General Occupational Objectives

Name _____

Package _____

OBJECTIVE # _____

OBJECTIVE # _____

OBJECTIVE # _____

OBJECTIVE # _____

OBJECTIVE # _____

OBJECTIVE # _____

OBJECTIVE # _____

OBJECTIVE # _____



THE CENTER FOR VOCATIONAL EDUCATION
1000 E. 10th Street, Suite 100, Oklahoma City, OK 73101

189

Form # 3A

ELECTRIC EDUCATION PROJECT

Occupational Performance Objectives

Name
Package
Objective #

OBJECTIVE STATEMENT:

Task List

1. _____

2. _____

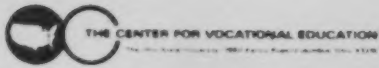
3. _____

OBJECTIVE STATEMENT:

Task List

1. _____

2. _____



METRIC EDUCATION PROJECT

Learning ActivityTITLE:

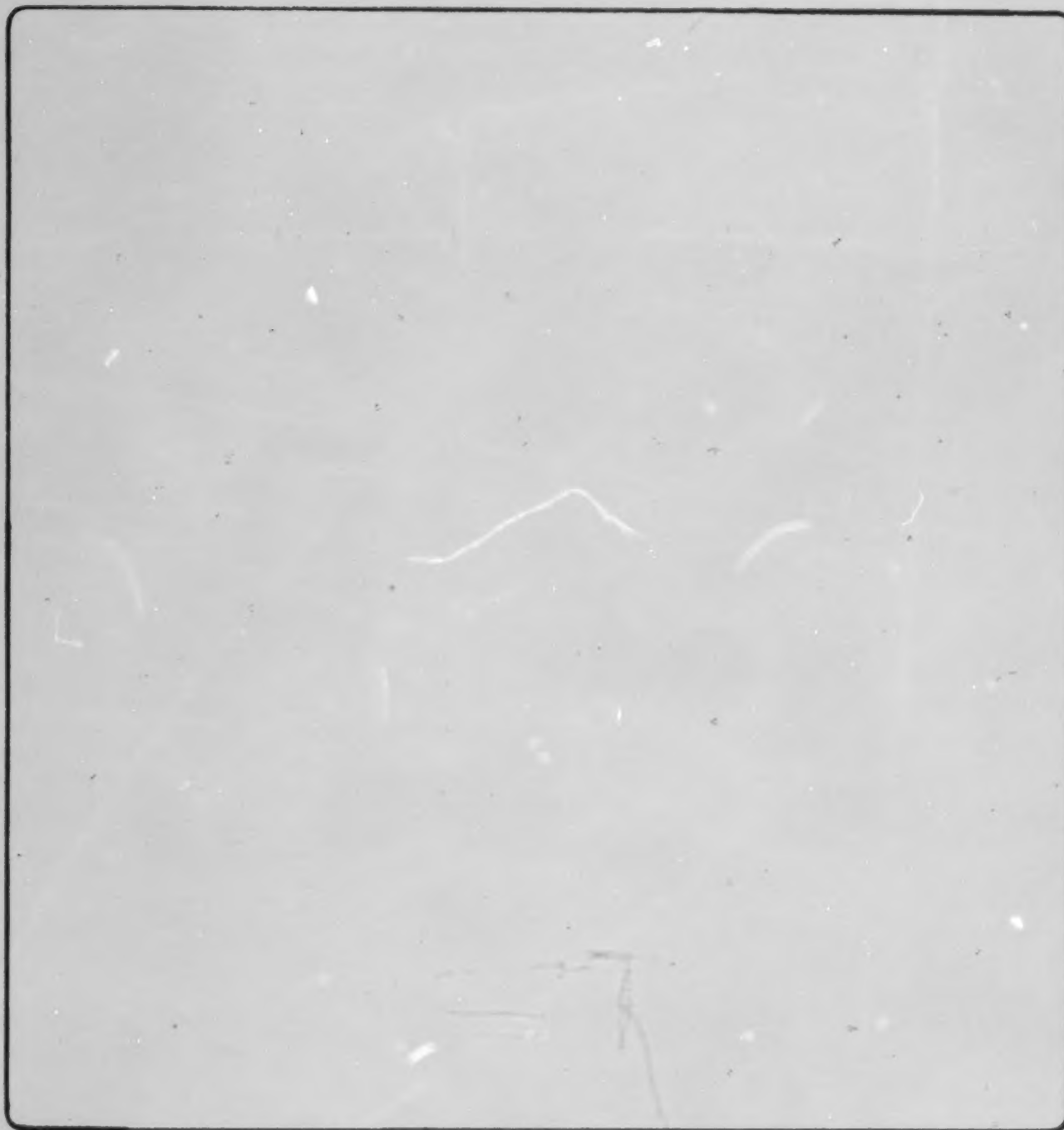
Name
Package
Objective #
Learning Activity #

METRIC EDUCATION PROJECT

Content

TITLE:

Name
Package
Objective #
Learning Activity #



NLTRIC EDUCATION PROJECT

Visual

TITLE:

Name _____

Package _____

Objective # _____

Learning Activity # _____

METRIC EDUCATION PROJECT

Student Exercise Sheet

TITLE:

Name
Package
Objective #
Learning Activity #



THE CENTER FOR VOCATIONAL EDUCATION
Two West Street, Providence, Rhode Island 02903

194

FORM # 8

METRIC EDUCATION PROJECT

References and Suppliers

Name

Package

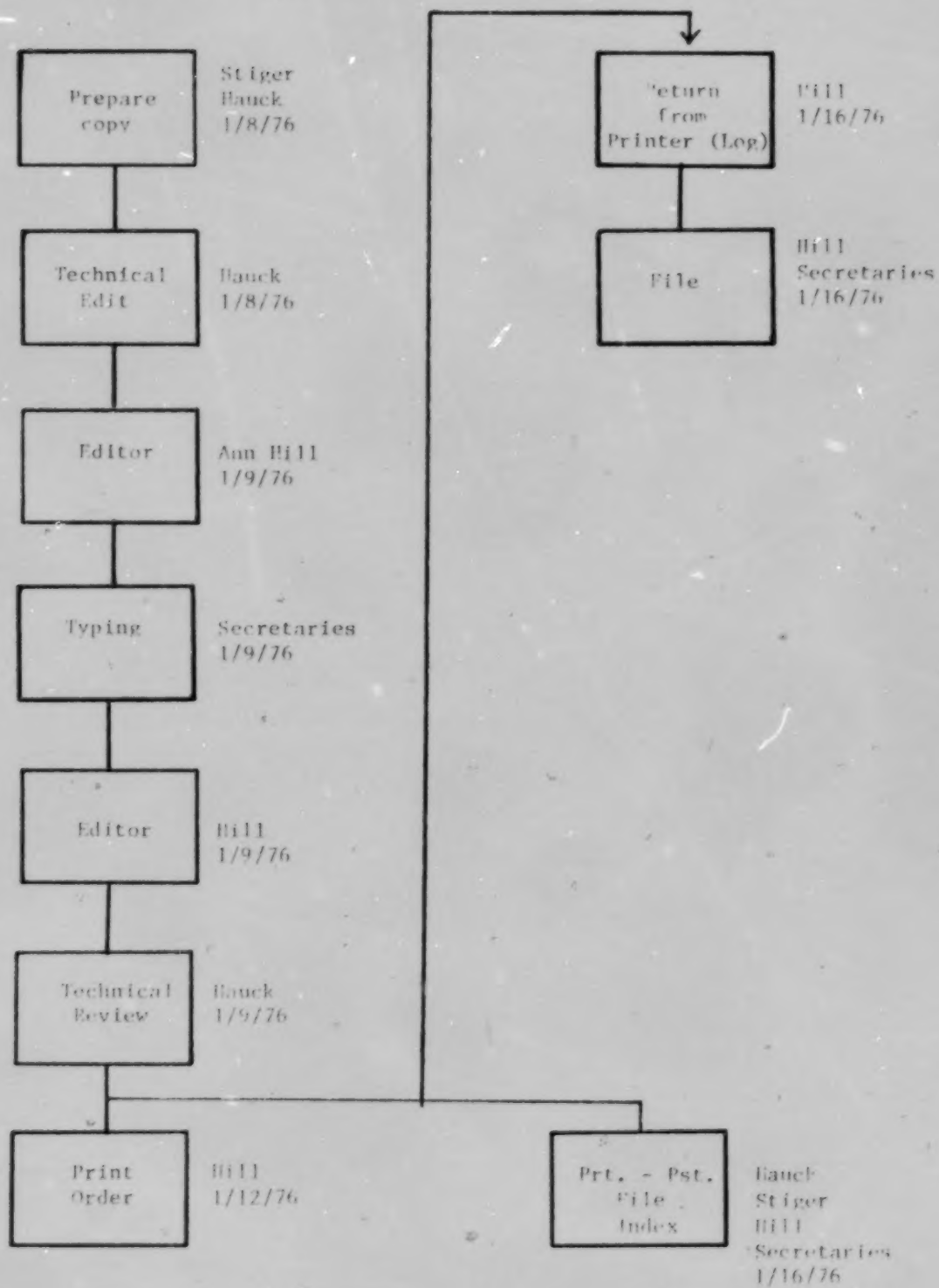
REFERENCE

Learning
Activity #

SUPPLIER

APPENDIX IV-E

Procedure for Developing Test Items



WORKFLOW PROCEDURE FOR TEST
INSTRUMENT PREPARATION1.0 Preparation1.1 Prepare Test File Envelopes

- 1.1.1 Retrieve test pages and answer sheets from each instructional package.
- 1.1.2 Prepare duplicate of test pages.
- 1.1.3 Obtain xerox copy of camera copy of unit from instructional package or Media Services.
- 1.1.4 Code envelope with package I.D. number.
- 1.1.5 Assemble materials for each package in a Test File envelope.

1.2 Prepare Workforms and Materials

- 1.2.1 Prepare coding system for test pages (cluster and package I.D. numbers).
- 1.2.2 Prepare coding system for test items.
- 1.2.3 Prepare Test Instrument Workflow Chart.
- 1.2.4 Prepare random number drawing device for randomizing the order of test item choices.
- 1.2.5. Prepare random number list for randomizing the order of the items on the post-tests.
- 1.2.6 Prepare the materials for the Pre-Test and Post-Test Item Index File.

1.3 Prepare Instructions for Staff

- 1.3.1 Preparation of Test File envelopes.
- 1.3.2 Instructions for typist.
- 1.3.3 Instructions for editor.
- 1.3.4 Instructions for reviewers.
- 1.3.5 Checklist for Test Item Processing.

2.0 Test Item Processing

- 2.1 Code each test item to package, the objective, and the information source.
- 2.2 Validate the test item.
- 2.3 Revise test items.
- 2.4 Complete items as needed.
- 2.5 Place choices and items in order.
- 2.6 Prepare the Pre-Test draft copy.
- 2.7 Submit for technical editing.

3.0 Technical Edit

- 3.1 Correctness of technical terminology and metric practices.
- 3.2 Consistency in coding items to instructional package objectives.
- 3.3 Construction and clarity of test items and related choices.
- 3.4 Submit to editor.

4.0 Edit

- 4.1 Edit for clarity; consistency in construction; correctness of language, spelling and punctuation.
- 4.2 Submit for typing.

5.0 Type

- 5.1 Type camera copy of Pre-Test.
- 5.2 Proof.
- 5.3 Consult Random Number List for Ordering Post-Test Items.
- 5.4 Type Post-Test.
- 5.5 Proof.
- 5.6 Submit to editor.

6.0 Final Edit

- 6.1 Check each item on camera copy against the draft copy.
- 6.2 Edit for spelling and typographical errors, format, style, and punctuation.
- 6.3 Submit for technical review.

7.0 Technical Review

- 7.1 Review for technical accuracy.
- 7.2 Submit to editor for printing.

8.0 Print and Package

- 8.1 Prepare work order
- 8.2 Submit to Media Services
- 8.3 Retrieve completed, assembled copies.
- 8.4 Package in classroom sets.
- 8.5 Maintain Workflow Chart on printing and packaging.

9.0 Prepare Item Index File

- 9.1 Code Pre-Test items from draft with Post-Test random number assignment.
- 9.2 Cut and paste on index cards.
- 9.3 File in Pre- and Post-Test Item Index File.

TASK ASSIGNMENTS AND SUMMARY

		Inclusive Dates Assigned	Days Effort Assigned
1. Test File Envelopes	Stiger	12/19/75-12/26/75	.5
Test File Envelopes	Parris	12/19/75- 1/2/76	2.0
2. Workforms and Materials	Stiger	12/19/75-12/26/75	.5
	Hauck	12/19/75-12/26/75	1.0
	Parris	12/19/75- 1/2/76	.5
3. Instructions for Staff	Hauck	12/19/75-12/23/75	1.0
4. Test Item Processing	Hauck	12/23/75- 1/8/76	5.0
(8 pkgs. each per staff member per day)	Stiger	12/26/75- 1/8/76	5.0
5. Technical editing	Hauck	12/23/75- 1/8/76	4.5
6. Editing	Hill	12/26/75- 1/9/76	2.5
7. Typing	Parris	12/22/75- 1/2/76	3.0
(350-375 pages)	Typist #1	12/29/75- 1/9/76	9.0
	Typist #2	1/5/76 - 1/9/76	5.0
8. Final Edit	Hill	12/26/75 - 1/9/76	1.5
9. Technical Review	Hauck	12/29/75- 1/9/76	3.0
10. Printing, Filing, and Packaging	Hill	12/30/75- 1/16/76	2.5
	Parris	12/30/75- 1/2/76	.5
	Typist #1	12/30/75- 1/16/76	2.0
11. Prepare Pre-Test and Post-Test Item Index File	Stiger	1/9/76-1/13/76	.5
	Hauck	" "	.5
	Typist #1	" "	2.0

STAFF ASSIGNMENT SUMMARY BY TASKS

Staff	1	2	3	4	5	6	7	8	9	10	11	TOTAL
Hauck 12/19/75-1/13/76		1.0	1.0	5.0	4.5				3.0		.5	12.0
Stiger 12/19/75-1/13/76	.5	.5		5.0							.5	6.5
Hill 12/26/75-1/16-76						2.5		1.5		2.5		6.5
Parris 12/19/75-1/2/76	2.0	.5					3.0			.5		6.0
Typist #1 12/30/75-1/16/76							9.0			2.0		11.0
Typist #2				2.0			5.0				2.0	7.0

PROCEDURE FOR TEST ITEM PROCESSING

- | | |
|----------------------|---|
| Code | 1. Code test item to General Occupational Objective. |
| | 2. Code test item to Occupational Performance Objective. |
| Validate | 3. Locate information or exercise in package which prepares the student to answer the question. Code item to Information Sheet, Table, Exercise Sheet, or Visual. <u>cg. E1</u> |
| | 4. Work out or find the answer to the question. |
| | 5. Revise the item and choices as needed (see <u>Guidelines</u> attached). |
| | 6. Check to see other items do not invalidate the test item (see <u>Guidelines #10</u>). |
| Randomize
Choices | 7. Randomize the choices. |
| Complete
Items | 8. Write multiple choice items for demonstration items or other items as needed. |
| Renumber | 9. Renumber the questions to correspond to the test answer sheet. |
| | 10. Cut and paste up the Pre-test draft copy. |
| Submit
Draft | 11. Submit Pre-test draft for technical edit. |

GUIDELINES FOR TEST ITEMS

General

1. Each multiple choice item may be a direct question, an incomplete statement, or a word or phrase.
2. Each item will have one choice which is correct or definitely better than the others.
3. Incorrect items should be plausible to reduce the guessing factor.
4. Plausibility of choices can be increased by using familiar, stereotyped or technical-sounding phrases, or phrases similar to those in the stem. Avoid nonsense choices or trick statements.
5. All choices should be grammatically consistent with the stem. If the verb is singular, avoid plural responses. Avoid the use of the article a or an as the final word in the stem. If an article is used and each choice does not go with one or the other of these articles, place the proper article at the beginning of each choice (see Item #2, e.g., Sample Format).
6. Keep the statements of the choices as brief as possible--preferably a single word, number, symbol, or short phrase.
7. Avoid the use of a negative word in the stem--if used, underline to bring it to the student's attention.
8. Each item should present only one problem or question.
9. Avoid indefinite statements.
10. Delete any irrelevant information from the stem or the choices.
11. Avoid making correct responses consistently longer or shorter than others.
12. Use parentheses around the numerals used to label the choices. (see Sample Format, attached).
13. A colon will be used at the end of the stem (see Sample Format).
14. The correct punctuation should appear at the end of the last choice in an item (see Sample Format).

Specific

1. Each item will have four (4) choices.
2. "None of the above" will not be used as a choice.
3. Abbreviations or measurement symbols will not be used in the stem or the choices for an item unless the item is testing the student's ability to recognize, write, or use an abbreviation or symbol.

4. The logical ordering of the test items which follows the flow of the Instructional Package will be preserved in the Pre-Test.
5. The first test item appearing in the Pre-Test will be numbered 10 (the Attitude Scale in the Student Booklet consists of nine (9) items which will precede the instructional test items).
6. Choices will be labeled (A), (B), (C), and (D) to match the mark-sense sheet.
7. If a test item statement (stem) begins with a number, the number will be written out.
8. The conversion table appearing in the test will be abstracted from the one appearing in the instructional package. It should contain enough of the table to present a challenge to the student; and be short enough to fit into the format. (Change the test item if necessary to meet these conditions).
9. The test items will be in 2 columns. (See Sample Format, attached)
10. A test item will not be considered valid and must be deleted or replaced if another item on the test provides the information which would insure the student's correct response.
11. The first word in each choice will not be capitalized unless it is a proper name.

SAMPLE FORMAT

Part II, "Testing Metric Abilities"

- | | |
|--|---|
| 10. One hundred twenty-five grams is about the mass of a: | 16. The correct way to write twelve thousand litres is: |
| [A] shoestring | [A] |
| [B] hamburger | [B] |
| [C] new-born baby | [C] |
| [D] Volkswagon "Beetle." | [D] |
| 11. The square metre is about the area of: | 17. |
| [A] a postage stamp | |
| [B] a bedspread | |
| [C] this sheet of paper | |
| [D] a card table. | |
| 12. Application rates of dry fertilizer for lawns are normally given in: | 18. |
| [A] | |
| [B] | |
| [C] | |
| [D] | |
| 13. The mass of bulk seeds is measured in: | 19. |
| [A] | |
| [B] | |
| [C] | |
| [D] | |
| 14. The correct way to write twenty grams is: | 20. |
| [A] | |
| [B] | |
| [C] | |
| [D] | |
| 15. | 21. |

APPENDIX IV-F

Field-test Evaluation Procedure

STANDARD FORM NO. 83 OFFICE OF MANAGEMENT AND BUDGET APRIL 1974 EDITION		CLEARANCE REQUEST AND NOTICE OF ACTION (Under Federal Reports Act and Bureau of the Budget Circular No. A-40, as amended)		FOR O.M.B. USE
IMPORTANT - Submit the required number of copies of SF 83, together with the material for which approval is requested to: READ INSTRUCTIONS BEFORE COMPLETING FORM		CLEARANCE OFFICER OFFICE OF MANAGEMENT AND BUDGET WASHINGTON, D.C. 20503		
PART A - REQUEST BY FEDERAL AGENCY FOR CLEARANCE *Items marked with asterisk may be omitted for preliminary plans or recordkeeping requirements				
1. SEND "NOTICE OF ACTION" TO Name and mailing address: Project Clearance Director Room 5909 ROB #3 DHEW/Office of Education Washington, D.C. 20202 Stop 113		2. Bureau and division or office originating request BOAE, DRD, CDB 3. Name(s), title(s), and telephone numbers of person(s) who can best answer questions regarding request. Mr. Donald Chill Project Clearance Tel: 245-7810		
FORM OR DOCUMENT IDENTIFICATION	4. Title of form or document submitted Instructional Materials for Metric Education		5. Agency Form Number(s)	
	6. Type of form or document 1. Application 2. Program evaluation 3. Other management report 4. Statistical survey or report 5. Preliminary plan or contract 6. Recordkeeping requirement 7. ☒ Other - Specify: <u>Instructional Materials Eval.</u>		7. Current (or former) O.M.B. clearance Number: <u>NA</u> Expiration date: <u>NA</u> 8. Requested expiration date	
	*10. Frequency of use 1. ☒ Single time 2. On occasion 3. Weekly 4. Monthly 5. Quarterly 6. Semi-annually 7. Annually 8. Other (See instructions)		9. Type of request 1. ☒ New 2. Revision 3. Extension (No change) 4. Reinstatement	
	*11. Related forms or documents (Give O.M.B. number. Enclose in parentheses any to be replaced.) None		12. Catalog of Federal Domestic Assistance program number (if applicable): 13.496	
COLLECTION AND RESPONDENTS	*13a. Collection method (Check as many as apply) 1. Mail 2. Personal interview 3. ☒ Other - Describe: <u>Teacher Administered</u> *13b. Collected by 1. Agency 2. Contractor 3. ☒ Other - Describe: <u>Voc. teachers in local schools</u>		14a. Type of respondents involved (Check predominant one) 1. Individuals or households 2. Business firms (non-farm) 3. Farms 4. Government agencies 5. ☒ Other - Describe: <u>Vocational students & voc. teachers in LEA's</u> 14b. Brief description of respondents (i.e., "households in 50 largest SMSA's," "retail grocery stores") <u>231 teachers & 6930 secondary and post-secondary students</u>	
	15. Summary of estimated respondent burden a. Estimated number of respondents: <u>7160</u> b. If sample, approximate number in universe: <u>Not a sample</u> c. Reports filed annually by each respondent (item 10): <u>2 (2 instruments/respondent)</u> d. Total annual responses (a X c): <u>14,320</u> e. Estimated average number of man hours required per response: <u>20 minutes</u> f. Estimated TOTAL MAN HOURS of respondent burden (d X e): <u>4774 hours</u>		16. Does your agency pledge confidentiality? 1. ☒ Yes 2. No	
AUTHORITY AND CONFIDENTIALITY	16a. Is report form 1. ☒ Voluntary? 2. Required to obtain benefit? 16b. Does your agency pledge confidentiality? 1. ☒ Yes 2. No			
CONSULTATIONS OUTSIDE AGENCY	17. In developing the report form or other documents, were consultations held with individuals or organizations outside your agency? 1. Yes 2. ☒ No If "Yes," identify persons and describe outcome in SUPPORTING STATEMENT. (See instructions)			
CERTIFICATION BY AUTHORIZED OFFICIALS SUBMITTING REQUEST - We certify that the form or other document submitted for approval is necessary for the proper performance of this agency's functions, that the information requested is not available from any other source, to the best of our knowledge, and that the request is consistent with applicable O.M.B. and agency policy directives. Signature and title of:				
Approving official for agency		Date		Agency clearance officer or other agency official
				Date

METRIC EDUCATION INSTRUCTIONAL MATERIALS FOR VOCATIONAL, TECHNICAL, AND ADULT EDUCATION¹

Joel H. Magisos and Gloria S Cooper²

The United States is the only industrialized nation which has not adopted SI metrics as its primary system of measurement. When Congress finally acts, there will be an urgent need for instructional materials which can be infused into existing vocational, technical and adult basic education programs. Foreseeing this need, the Curriculum Development Branch in the USOE Bureau of Occupational and Adult Education funded the three-year Metric Education Project at The Center for Vocational Education at The Ohio State University. The goal is to intercept this predictable need with an inservice education program and instructional materials for use in 75 occupational preparation programs and in adult basic education.

Major Project Tasks

The Metric Education Project is engaged in several major tasks which contribute to the goal of the project:

1. Developing an annotated bibliography
2. Developing a position paper
3. Developing and testing instructional materials
4. Planning and conducting inservice education
5. Preparing an implementation guide

Each task will lead to a product which may be used by vocational education and adult basic education administrators, curriculum developers, or teachers.

The tasks are interrelated in many respects (Figure 1). It was necessary to find out what was going on in the field and begin assembly of the component parts for instructional packages. This work resulted in an annotated bibliography. As we became acquainted with the materials and people in the field we began to develop a position on metric education. The resultant position paper has contributed significantly to instructional package development and will help us with the inservice education plan and implementation guide. The inservice education plan and program will flow from the instructional materials and will provide the experience needed to prepare an implementation guide.

¹Presentation to the Vocational Instructional Materials Section of the New and Related Services Division at the American Vocational Association convention in Anaheim, California, December 7, 1975.

²Dr. Magisos and Ms. Cooper are co-directors of the Metric Education Project at The Center for Vocational Education, The Ohio State University.

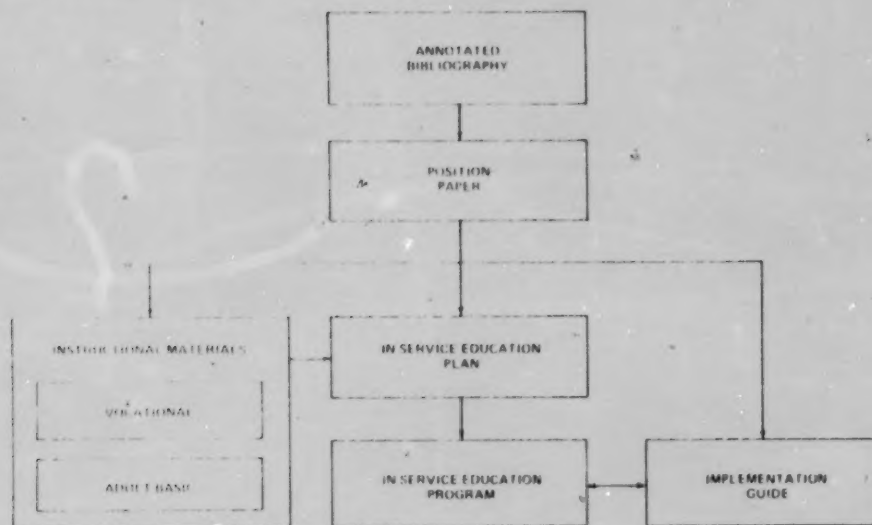


Figure 1 Metric Education Project Tasks

Developing an Annotated Bibliography

The project staff acquired and screened over 5,000 instructional and reference materials, 369 of which were annotated for inclusion in a bibliography. The bibliography is organized to permit access to the materials by type, occupational cluster, educational level, author, title, and producing agency. In addition, lists of suppliers, resource persons, and organizations are included.

Developing a Position Paper

The position paper deals with the issues and problems of implementing metric instruction in occupational and adult basic education programs in the United States. The paper includes sections on metrication issues, the metric system, vocational-technical curriculum, adult basic education curriculum, and instructional strategies.

Developing and Testing Instructional Materials

Instructional packages are being developed for 75 occupations. Involved has been selecting occupations; developing objectives; deriving general and specific content; devising teaching and learning sequences; assembling or developing text, visuals, exercises, tests, and references; and producing the packages. Activities have been divided between project staff, teacher consultants, and production personnel. All instructional packages will be tested with teachers and students, and refined upon the basis of collected data.

Metric instructional packages are being developed for three adult basic education levels. Content and instructional strategies are based upon a special advisory committee's recommendations, and program site visit observations. An adult basic education specialist has been developing the products which also will be tested and refined.

Planning and Conducting Inservice Education

A performance based inservice education workshop program will be planned and conducted for vocational, technical and adult basic education program personnel in each of the 10 DHEW regions. Approximately 750 persons are expected to exhibit competency with the metric system and the instructional materials as a result of the 10 workshops.

Preparing an Implementation Guide

A guide is to be developed which will help state supervisory personnel, university teacher educators, local administrators, and instructional personnel implement instruction in metrics in local programs. Content for the guide will be based upon field trials with the instructional materials and tested in the inservice education program.

Project Schedule

The project schedule (Figure 2) extends over a three year period. We completed the bibliography during the first six months and it has been available since on a cost-recovery basis from The Center. The position paper was completed during the second six months and also is available. Concurrently, we were assessing possible instructional strategies, conceptualizing the instructional packages, and dealing with the inquiries attracted by a national project. We now are preparing the instructional packages for test. We must complete the field trials this spring so that we can revise and produce them for the inservice education programs next year. We had hoped that we could develop some "spin offs" of the project: for example, succeeding editions of the bibliography, a resource center, or additional instructional packages. Inflationary pressure on our three-year contract has been extraordinary, but we still have not ruled out the possibility. We are cataloging new materials as we acquire them and are looking for opportunities to fund additional packages.

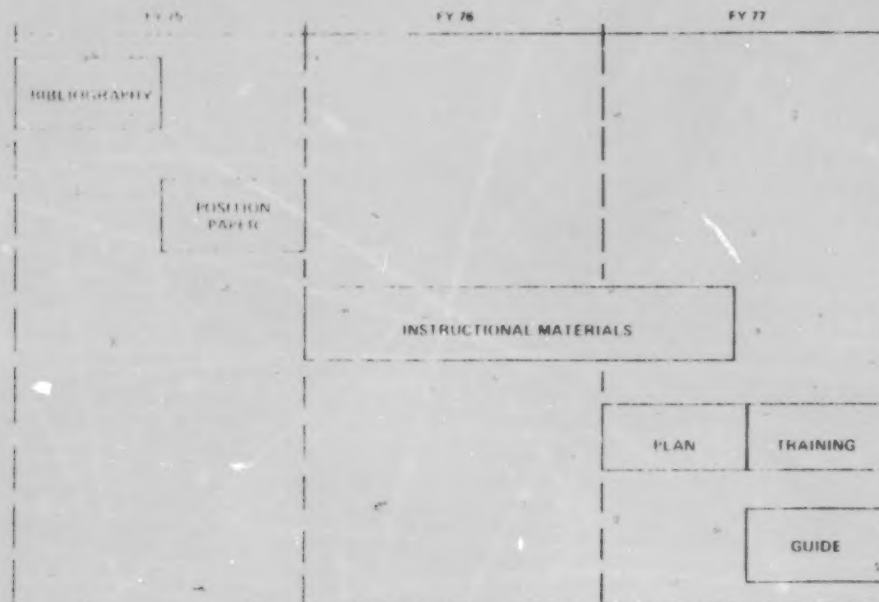


Figure 2 Metric Education Project Schedule

Instructional Package Development

The phases of instructional package development include the selection of occupational areas, the design of a prototype package, the development of individual packages, field trial, and revision and production (Figure 3).

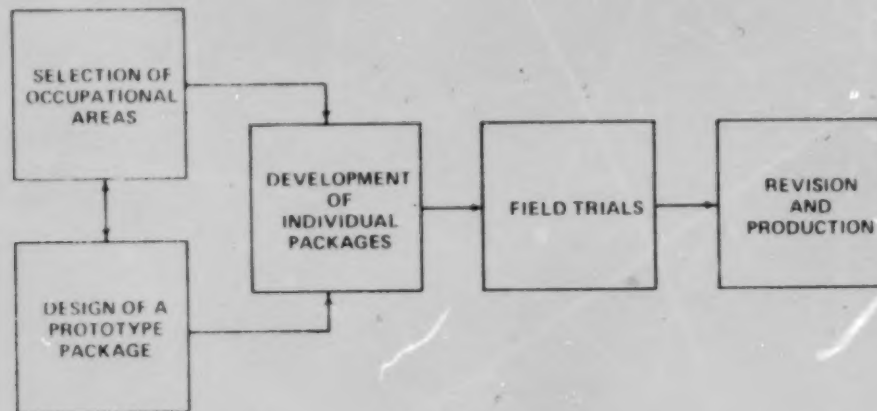


Figure 3 Instructional Package Development

Selection of Occupational Areas

Data was collected to use in deciding which 75 occupations needed metric instructional packages. The 75 occupations were chosen upon the basis of job opportunities, program enrollments, number of programs, and the amount of measurement used in the occupations. State Plans and statistical reports were the sources of the data. Ranks were assigned to occupations within clusters based on criteria rating. A panel of experts reacted to the selections.

Design of a Prototype Instructional Package

A prototype instructional package was developed concurrent with selection of occupational areas. The prototype had elements which were common for all occupational areas and elements unique to specific occupational areas. The prototype was seen as a pattern to be used by teacher consultants in their work to develop unique elements of the individual packages for each occupation. The prototype was the basis for workflows later used to facilitate the work of project staff and teacher consultants in developing the unique elements of the 75 individual packages.

The prototype demonstrated the necessary substantive content, teaching-learning process, and outcomes to be included in every package. For example, every package was to facilitate:

1. Recognition and use of metric terms, units and symbols unique to an occupational area
2. Recognition and use of metric relationships
3. Recognition and use of metric instruments, tools, and devices unique to an occupational area
4. Recognition and use of metric and customary systems interchangeably.

Teacher consultants were able to develop unique elements quickly, using the prototype as an example. Individual packages were roughed out in as little as two days each. Teacher consultants interacted with project staff on the merits of the prototype design and made suggestions that were incorporated in the field trial production model.

Some general specifications guiding development of the prototype were:

1. That the instructional packages would be used as units to be infused into ongoing occupational education programs
2. That the units would apply metrics to the occupation, but deal primarily with metric knowledge and skills, not with basic mathematical measurement, or occupational knowledge and skills
3. That the packages would help students deal with the transition period of metric change-over

Development of Individual Packages

It was believed that vocational teachers must be involved in the development of packages. Who else really knows the workings of vocational classes, is sensitive to vocational student needs, understands the kinds of learning experiences needed and can identify measurement skills relevant to the entry-level requirements of an occupational area? Consequently, ten vocational teacher consultants were engaged to develop the first draft of the 75 packages.

We developed a set of simple work forms to facilitate identification of unique measurement tasks for an occupational area, development of student activities, design of visuals and tables, and formulation of test items. An intensive, two-day training program on metric and package development was conducted for the teachers. The aim was to involve the teachers in the curriculum development process, primarily to use their perspective as teachers.

The project staff managed the workflow and facilitated the teachers' work. As package elements were produced, they were assembled and edited. Teachers suggested reorganization of the prototype for the field version. It was decided that the field version should be produced in style and format planned for the final version.

Field Trial

Each instructional package is to be tried out in actual occupational education programs. Pre- and post test data and teacher reaction data will serve as a basis for package revision.

Revision and Production

Data will be examined and necessary revisions made in the final version. The final production version will be printed for use in 10 workshops.

Instructional Package Elements

Each metric instructional package includes a section on teaching and learning metrics; objectives and suggested teaching sequences for four occupational outcomes; textual information, tables, visuals, and exercises for each outcome; a test; and a list of references. The package is made up of

both common and unique elements; for example, the section on teaching and learning metrics is common to all packages while the exercises are unique to each occupation. The packages will be in loose leaf form so that teachers may detach parts for use as overhead projection transparency masters or for student use.

Teaching and Learning Metric

The teaching and learning metric section encourages teachers to adapt the materials to preparing students for job performance. It explains the organization of the materials (Figure 4) and gives helpful suggestions for teaching the metric system and using the materials.

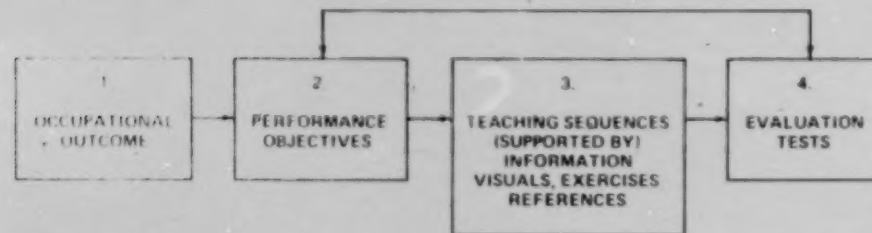


Figure 4 Instructional Strategy

Objectives and Suggested Teaching Sequences

Objectives are stated in terms of occupational outcomes (e.g., "The student will recognize and use metric units, terms, and symbols") and specific performance objectives (e.g., "Given a measurement task, select the appropriate metric unit"). The suggested teaching sequence is given in steps with specific reference to specific elements in the instructional package.

Textual Information

The textual information is kept as brief as possible. It is intended as an aid to the teacher in identifying essential content and presenting it. After experience with the metric system, most teachers will use it as a refresher.

Tables

The tables are both common and unique to the packages. The metric units, symbols and referents selected for one table are useful in most packages. Metric units for use in each occupation vary and are developed separately for each package. The conversion tables are adapted for each package.

Visuals

Overhead projection transparency masters were developed to illustrate the relationship of length, area, volume, capacity and mass; physical referents to temperature; and the relationship of prefixes and decimal values.

Exercises

Exercise sheets in the instructional packages facilitate the assignment of "hands-on" practice with concepts and job skills. They are designed for duplication and independent activity. Most exercises are unique to the occupation. Students using the exercise sheets will get experience with applying metric concepts to job-related tasks.

Tests

Tests have been developed for use in the final version. They do not appear in the trial version of the package because they will be used to assess package effectiveness. Test items will test student performance called for in the objectives.

References

The reference sheet provides an annotated listing of publications, metric suppliers, and information sources.

Summary

The USOE funded Metric Education Project at The Center for Vocational Education has developed an annotated bibliography, position paper, and field trial versions of instructional materials for 75 occupations. It will be trying the packages with teachers and students in early 1976. Data collected during these trials will be the basis for revisions leading to a final version. The final version will be used in 10 regional inservice education workshops for 750 vocational, technical, and adult educators.



A. Supporting Statement for New Form or Reporting Requirement

I. Justification

- (1) The four attached instruments (see Appendix C) submitted here for OMB review are part of the Metric Education Project being conducted by the Center for Vocational Education (CVE) at the Ohio State University for the U.S. Office of Education (Contract No. OEC-O-74-9355). (These instruments are associated with one of 77 instructional packages being developed by this project at CVE in metric sensitive occupations.) All of these packages will be formatted exactly the same but will contain unique vocational metric content. Only one set of instruments is being submitted for OMB review because instruments for all the instructional packages will be the same.

The four instruments submitted here for OMB review include: one student pre-test, one instructor pre-test, one student post-test, and one instructor post-test. These instruments will be used in the field testing of instructional packages developed for the Metric Education Project. Solicitation No. RFP 74-64 (Contract No. OEC-O-74-9335) specifies that each of these instructional packages be field tested at three school sites each containing a respondent group of 30 students.

- (2) In accordance with the project proposal, CVE project staff will use data from the instruments to accomplish four major purposes: (a) to collect attitudinal data regarding teacher and student perceptions about the need to learn the Metric System. (b) to collect formative data which will help the staff make necessary revisions to the instructional packages; (c) to collect summative data on the effectiveness of the instructional packages relative to the eight elements of each package (see Teacher's post-test, Part III and Evaluation Report, Table 7 and pp. 11 - 12) and (d) to determine whether the students achieved the instructional objectives.

- (3) Data collected from these instruments will be specific to the 77 instructional packages being developed by this project. No similar data exists.

2. Description of Survey Plan

- (1) The potential respondent universe consists of an estimated 5,511,500 vocational students in grades 10 through 12 and 1,349,465 post secondary vocational students. These figures are taken from Learning a Living Across the Nation, Volume 3. Part 2. Project Baseline, Third National Report, Baseline Year 1972-73 (Flagstaff, Arizona; Northern Arizona University; November 1974). Dollar and time constraints inherent in the metric education contract require that CVE project staff minimize the number of sites for field testing but maximize representation among sites.

The contract specifies three test sites, with 30 students each, per package. Seventy-seven vocational packages were developed (see Appendix B); therefore, a total of 231 unique classrooms are required. However, since the likelihood of finding one site offering the 77 programs for which were packages developed is not probable, it is anticipated that field trials will be held at 6 major sites.

Nine programs are offered at post-secondary schools only, which increases the probability of more rather than less sites.

Following is a list of metric package characteristics which impose necessary criteria for proper field testing. The packages are designed for:

1. Vocational programs grades 10-14, with the exception of the Arts and Humanities Cluster which contains programs not usually

included in the category VOCATIONAL.

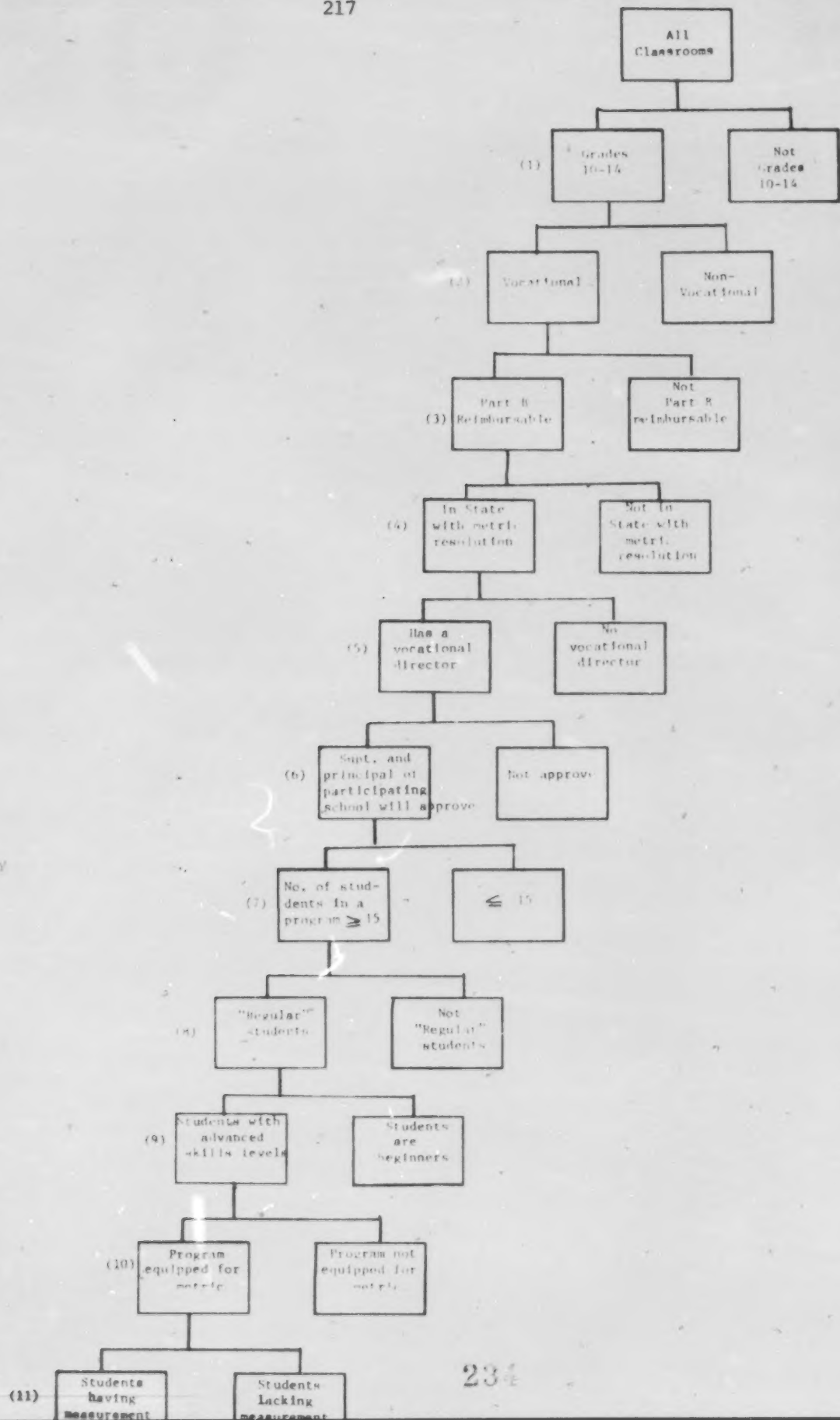
2. Programs where there is a need to metricate.
3. Infusion into ongoing, regular programs.
4. Students who already know the terminology, tools and equipment unique to the given program.
5. Students who already know the measurement skills used in the given program.

The following logic flow chart helps to explain the process and criteria used in site selection. (See page 4)

Comments on Individual Cells of Flow Chart

Cells:

- 1, 2, 3, The classroom population from which the respondent population will be drawn will be vocational, Part B reimbursable, grades 10-14.
- 4 The metric packages are teacher dependent. They assume that teachers already have a need to metricate their classroom in response to the metric changeover in business and industry. To deal with this variable, CVE will field test in those states which have adopted resolutions to metricate by December 1974 through their State Boards of Education. Twenty-four states have already done so. (Appendix D) Those states which have developed and adopted a plan for metrication are the most desirable for selection. Four states have done so. Fourteen of the resolutions include some timetable for action.
- 5 The local site coordinator of the field testing should be someone who interacts institutionally, with vocational teachers.



- A natural candidate for this role is the vocational director.
- 6 In order to ensure the cooperation of the local school, the approval of the school's principal and the District's Superintendent of Schools must be obtained.
- 7 Since certain vocational programs contain a small number of work stations, classes of 30 may not be found. To maximize representation, a class that has 15 or less students will not be accepted.
- 8 The metric materials are not designed for disadvantaged or special education students. Therefore, regular programs will be selected. This addresses package characteristic No. 5.
- 9 CVE will field test in classes which are beyond the introductory level to conform to program characteristic Nos. 4 and 5.
- 10 Since each package identifies the metric measurement terms, tools and devices unique to it, and since these vary from package to package, each program must provide its own metric tools. In states where there is pressure to metricate, this is more likely to happen. The metric packages contain exercises and hands-on experiences dependent on such tools.
- 11 The packages presuppose measurement skills mastery unique to the given occupational area. They are not designed to teach measurement skills.

(3) NA

(4) Contractor is OSU/CVE

The role and responsibilities of OSU/CVE are to develop metric instructional materials for 75 vocational program areas and adult basic education. OSU/CVE is responsible to the project's sponsor, USOE/BOAE for five products: (a) an annotated bibliography,

(b) a position paper, (c) metric instructional packages for 75 vocational program areas, and adult basic education, (d) an in-service workshop to be conducted in each of the ten USOE regions, and (e) an implementation guide.

Instruments will be destroyed once post-tests are received. Tapes and punch cards will be destroyed within one year after the project's completion.

3. Tabulation and Publication Plans

- (1) NA. Data obtained from the instruments will be used by CVE project staff for curriculum package revision only.
- (2) All responses will be coded and key punched for the computer. Means will be calculated for pre- and post-test scores. Then a "t" will be determined to see if there is a significant difference between pre- and post-test scores. All open-ended responses will be summarized. (see "A Pilot Test Evaluation for the Metric Education Packages," Appendix A, to be prepared for each package)

4. Time Schedule for Data Collection and Publication

- (1) This is a three-year project which began July 1, 1974 and will terminate June 30, 1977. Field testing, using instrumentation included with this OMB submission, will be conducted from March 15 through April 9, 1976. Utilizing data generated during this field testing, curriculum package revision will take place from April through August 1976. No publication of the results of field testing and curriculum revision is anticipated aside from quarterly reports to the project's sponsor.

- (2) NA.

5. Consultations Outside the Agency

- (1) NA. No consultation outside OSU/CVE was solicited. However,

research specialists in related areas within OSU/CVE were consulted and, in most instances, their comments were incorporated into project instruments. There were no problems which could not be resolved.

(2) NA

(3) NA

6. Estimation of Respondent Reporting Burden

(1) The "Estimated average number of man hours required per response" (item 15 e, SF No. 83) is based upon OSU/CVE staff experience and small "in house" tests of the instruments, involving 9 people.

(2) NA

(3) NA

7. Sensitive Questions

Insofar as CVE can determine, no sensitive questions are asked of respondents. However, the instruments were submitted to CVE's Protection of Human Subjects Committee in accordance with established guidelines and regulations and were approved.*

The instruments include items designed to gather demographic data on the respondents. These include questions concerning the age, education, role, and sex of the respondents. The intent of these demographic items is to provide the project's staff and sponsor with a descriptive profile of the population field testing the curriculum packages. A further purpose of these demographic items is to determine whether or not elements of the curriculum and specific test items within the instruments are discriminating against groups of individuals because of various aspects of their demographic profile such as race or sex. Data indicating any such

* DHEW - Protection of Human Subjects (Federal Register, Vol. 39, No. 105, May 30, 1974 and Human Subjects Program Guidelines for Review of Research and Training Programs Involving Human Subjects. The Ohio State University: Revised January 1, 1973.

discrimination will be used as the basis for curriculum revision.

CVE project staff will obtain the permission of participating schools to pilot test the curriculum materials developed in the Metric Education Project. Participation of teachers and students is on a voluntary basis as explained on each of the four instruments. The purpose of the instruments is to help project staff evaluate and improve a new set of instructional materials. The written introductions also explained that participation is voluntary, there is no penalty for nonparticipation and that respondents should feel free not to respond to individual questions about which they felt reluctant.

Respondent codes on completed instruments, along with test items, will be coded on computer punch cards at CVE. Once both the completed post- and pre-tests have been received at CVE, completed instruments, as well as lists matching respondents' codes with computer tape codes, will be destroyed. All computer tapes and punch cards will be destroyed within one year of the project's completion.

8. Estimate of Cost to the Federal Government

- (1) Total project cost is \$496,071.00. The pilot test phase will cost \$29,891.00.

(2) NA

(3) NA

(4) NA

B. Updating Supplemental Supporting Statement for Extension or Revision
of Existing Form, Other Document

NA

C. Other Documents to be Submitted

(1) Related Background Documents:

- a. Appendix A "A Pilot Test Evaluation Report for the
Metric Education Packages"
- b. Appendix B "Metric Instructional Packages Under Development"
- c. Appendix C - Instrumentation for OMB Review
 - Student pretest
 - Student Post test
 - Instructor's pretest
 - Instructor's post test
- d. Appendix D
 - List of states with metric resolutions

APPENDIX A

52

A
PILOT-TEST
EVALUATION REPORT
FOR THE
METRIC EDUCATION PACKAGES

Metric Education for ()

The Center for Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

1975

TABLE OF CONTENTS

	Page
I. Introduction	
II. A Description of the Pilot-Test Procedure	
III. The Pilot-Test Participants: A Description	
IV. A Summary of the Student Performance Data	
V. Student Reactions to the Materials	
VI. Teacher Comments, Reactions, and Suggestions	
VII. Summary	
Appendix	

I. Introduction

Basically, there were two purposes underlying the conduct of the pilot-test for this particular instructional package. The first was to provide a summary of the information collected that related to the package's effects upon the achievement and attitudes of the students tested. It was assumed that the resultant findings would be of direct value to potential adaptors of the package, as well as to those engaged in its further testing and evaluation. The second purpose was to provide the developers with information that would have direct applicability in terms of their revision efforts. In that regard, it was assumed that students' and instructors' perceptions of the major strengths and weaknesses which they saw in the package would have the greatest utility. As a result, a variety of such perceptual data were collected to supplement the student achievement and attitudinal data.

II. A Description of the Pilot-Test Procedure

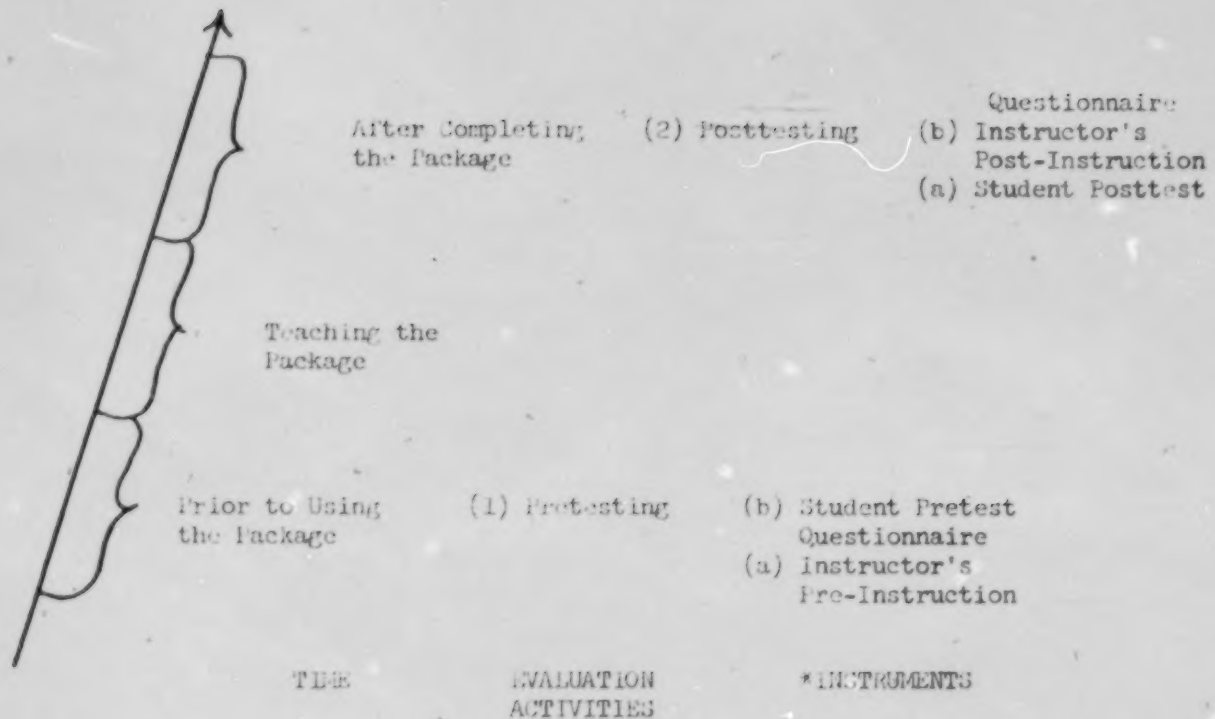
As alluded to above, during the course of the pilot-test effort the students and teachers were asked to provide a variety of different kinds of data. The overview presented in Figure 1 on the following page illustrates both the nature and sequencing of those data.

An inspection of that figure reveals that the pilot-test participants were required to engage in four kinds of evaluation activities. Those activities were as follows:

1. As part of their orientation and in-service the participating instructors were required to complete a pre-instruction questionnaire. That instrument was designed to collect information regarding their attitudes toward the adoption of the metric system and some background data regarding their students.

Figure 1

An Overview of the Pilot-Test Effort



2. Another aspect of the pretesting stage related to the testing of the students. More specifically each student involved was required to complete a package specific pretest. That instrument consisted of an achievement test (comprised of items that would normally be included in the instructional packages).

* Copies of the different instruments listed are contained in the Appendix.

3. After the presentation of the package was completed the students were required to complete a posttest. That instrument contained both the achievement test and attitude scale included in the pretest (but with items randomly reordered), as well as several additional, open-ended questions. Those additional questions were included in order to obtain the students' perceptions regarding the good and bad points which they saw in the materials.
4. The last evaluation instrument of the four was the Post-Instruction Questionnaire completed by the instructors. That instrument included the attitude scale mentioned in relation to the Pre-Instruction Questionnaire, as well as questions designed to elicit more revision directed reactions and comments from the respondents.

III. The Pilot-Test Participants: A Description

Overall, the pilot test was conducted in 6 major sites. Across those sites a total of 3 instructors and their respective classes involving a minimum of 15 students per class were involved. A brief description of that sample of instructors, as afforded by their responses to several questions on the Pre-Instruction Questionnaire, is presented in Table 1.

Table 1

Several Characteristics of the Instructors Who Participated in the Pilot-Test

Question	Responses	f	Question	Mean	Range
What are you?	Male Female		How old are you?		
What is your highest level of education?	High school Some college Bachelor's Master's Doctor's Other		How many hours of training in metric education have you had?		
			Approximately how many hours of experience have you had teaching the metric system?		

The total number of students exposed to the package during the pilot test was (). A brief description of that sample in terms of a selected set of background variables is presented in Table 2. The data upon which that summary is based were obtained via the Pre-Instruction Questionnaire completed by the participating instructors.

Table 2

Selected Background Characteristics of the Student Sample

Question	Responses	f	Question	Responses	f
Student's Sex?	Female		Teacher's Estimate of Student's Measurement Skill?	Excellent	
	Male			Very Good	
				Good	
				Fair	
				Poor	
Race?	American-Indian		Teacher's Estimate of Student's Knowledge of Occupational Terminology?	Excellent	
	Black			Very Good	
	Mexican-American			Good	
	Oriental			Fair	
	Puerto Rican			Poor	
	Spanish Surname				
	White				
	Other				
Education: Head of Family	No schooling		Teacher's Estimate of Student's Math Skills?	Excellent	
	Elementary school			Very Good	
	High school			Good	
	College			Fair	
	Uncertain			Poor	
Teacher's Estimate of Student's Reading Skills?	Excellent				
	Very Good				
	Good				
	Fair				
	Poor				

IV. A Summary of the Student Performance Data

As was pointed out in the description of the student pre and post tests, two aspects of student performance were assessed during the pilot test. The first of those dealt with the student's attitudes toward the metric system, which were obtained via a nine item attitude scale incorporated into the pre- and post-test booklets. The second performance indicant considered was their achievement as related to the objectives contained in the package. That performance was measured using items prepared by the package developers and incorporated into the total set of instructional materials.

The total set of achievement items incorporated into the pre and post tests were of particular interest since they were separable into subscores that corresponded with the major objectives of the package. In this particular instance the objectives to which the derived subtest scores were related were as follows:

Unique
per
Package

1. Recognize and use metric units, terms, and symbols for length, area, volume, mass, and temperature.
2. Recognize and use metric equivalents and relationships among metric length, volume, and mass measurements as used in horticulture.
3. Recognize and use instruments, tools, and devices for measurement tasks in horticultural occupations.
4. Estimate, measure, and verify metric measurements in horticultural tasks.
5. Recognize and use metric and customary units interchangeably in ordering, selling, and using horticultural products and supplies.

Given this total set of performance related indicators, a major evaluation question posed was, "Did the performance of the students change as a result of their exposure to the package?" That question was addressed via the conduct of several statistical comparisons between the pretest and

post test scores of the participating students. Although a number of problems exist in terms of interpreting and generalizing the results of such analyses, it was assumed that the information generated could still be of value to both the revisors and potential adapters. The resultant findings are summarized in Table 3.

Table 3

The Results of the Statistical Comparisons Between Pre and Post Scores

Subscores	Means		Univ. t-value	p-value	Mult. T ² -value	p-value
	Pretest	Posttest				
Attitude						
Overall Achievement						
Achievement-Objective 1						
Achievement-Objective 2						
Achievement-Objective 3						
Achievement-Objective 4						
Achievement-Objective 5						

Overall, the results summarized in Table 3 suggest the following:

{ A description of the findings contained in Table 3.

In addition to the basic question raised above regarding the relationship between shifts in performance and exposure to the package materials, the following question was also asked. "What, if any, relationships existed between the selected student demographic characteristics and changes in student performance?" The correlational analyses conducted in order to address that question are summarized in Table 4.

Table 4

The Correlations Between Student Demographics and Changes in Performance

Variable	Mean	Variance		
1. Sex				
2. Race				
3. Education: Head of Family				
4. Teacher Estimate of Reading Skill				
5. Teacher Estimate of Measurement Skill				
6. Teacher Estimate of Knowledge of Occupational Terminology				
7. Teacher Estimate of Math Skills				
8. Attitude - Pretest				
9. Achievement - Pretest				
10. Attitude - Gain				
11. Achievement - Gain				

	Correlations			
	(8)	(9)	(10)	(11)
Depend. Variables:	Att.-Pre	Ach.-Pre	Att.-Gain	Ach.-Gain
1. Sex				
2. Race				
3. Education: Head of Family				
4. Teacher Estimate of Reading Skill				
5. Teacher Estimate of Measurement Skill				
6. Teacher Estimate of Knowledge of Occupational Terminology				
7. Teacher Estimate of Math Skills				

* Significant at $\alpha = .05$ level

The findings contained in Table 4 suggest the following:

A description of the findings contained in Table 4.

In summary, it should be reiterated that the pilot test was designed primarily to collect data that would be useful in revising this instructional package. As a result, that test does not represent a true, "experimental" evaluation of the materials and some caution needs to be exercised in terms of over interpreting the findings evolving from that effort.

V. Student Reactions to the Materials

One important set of questions on the posttest to which the students were asked to respond dealt with their perceptions regarding the good and bad points of the experiences they were provided. Their responses to those different questions were as follows:

Listings of the good and bad points about the experiences in metric education that were recalled by the students.

VII. Teacher Comments, Reactions, and Suggestions

As indicated in Section III, during the pretesting stage of the pilot test, the teachers were asked to answer several questions regarding their attitudes toward the adoption of the metric system, as well as provide the kind of background information listed in Tables 1 and 2. During posttesting they were asked to respond to the same attitude questions, along with others that were designed primarily to elicit more revision directed comments and reactions. One subset of those additional items dealt with their general attitude toward the package.

Given the types of data collected from the teachers, the first set of analyses undertaken dealt with their attitudes. More specifically,

it focused on describing the changes in their attitude toward the adoption of the metric system in addition to their more general attitude toward the package as alluded to above. The results of that analysis are summarized in Table 5.

Table 5

A Summary of the Teachers' Attitudes

Variable Under Consideration	Time	Potential Variable Limits	n	Observed Mean
Attitude Toward Adoption of the Metric System	Pre Post Gain			
General Attitude Toward the Package	Post			

The description analysis summarized in Table 5 suggests:

{ Implications of the results contained in Table 5.

A second major subset of items completed by the teachers dealt directly with several general kinds of problems which they may have encountered while using the package. Those different items and the teachers' responses are summarized in Table 6.

The results contained in Table 6 suggest:

{ Describe the potential implications of the results summarized in Table 6. Assimilate any comments made by the teachers into that description.

Table 6

Several Possible Areas of Teacher Concern Regarding the Package

Potential Area of Concern	Response Frequencies			
	Strongly Agree	Agree	No Opinion	Strongly Disagree
The directions for using this instructional package were clearly written and complete.				
The metric content contained in the package was clearly written.				
The metric content contained in the package was written at a level appropriate for most of my students.				
Generally speaking, the package contained too much material to cover in the time allotted.				
The format of the package facilitated the instructional process and made it easier.				
As we were going through these materials, I found that the student had difficulty thinking metric.				
Teaching the materials in this package take up too much time.				
I feel this package will fit very well into my regular instructional program.				
"Teaching and learning metrics in _____ occupation" is clearly written and complete.				

In addition to the more general issues and concerns raised via the items included in Table 6, the teachers were asked to answer three basic questions regarding each major part of the package. Those questions were as follows:

1. How would you rate this particular part of the package in terms of its usefulness?
2. What was the single best thing you saw in this particular part of the package?
3. What one major problem did you see in this part of the package and how would you suggest that it be alleviated or resolved?

Table 7 contains a summary of the teachers responses to each of those questions.

Table 7

Teachers' Assessments of the Different Parts of the Package

Part of Package	Question	Responses
Objectives	Usefulness?	Mean = _____ s = _____ Range = _____
	Best Thing?	A listing of the comments made by the participating teachers.
	Major Problem?	A listing of the specific comments made by the participating teachers.
Learning Activities	Usefulness?	Mean = _____ s = _____ Range = _____
	Best Thing?	
	Major Problem?	
Metric Content	Usefulness?	Mean = _____ s = _____ Range = _____
	Best Thing?	
	Major Problem?	

Visual Aids	Usefulness?	Mean = _____	s = _____	Range = _____
	Best Thing?			
	Major Problem?			
Student Exercises	Usefulness?	Mean = _____	s = _____	Range = _____
	Best Thing?			
	Major Problem?			
Metric References	Usefulness?	Mean = _____	s = _____	Range = _____
	Best Thing?			
	Major Problem?			
In-Service Training	Usefulness	Mean = _____	s = _____	Range = _____
	Best Thing?			
	Major Problem?			
Student Tests	Usefulness?	Mean = _____	s = _____	Range = _____
	Best Thing?			
	Major Problem?			

The material contained in Table 7 suggests that:

A listing of the revision related ideas and suggestions derived from the Teacher's comments.

VIII. Summary

Recap the major findings of the pilot test (in an abstract fashion) in terms of their direct implications for serving the two purposes identified in the Introduction.

APPENDIX B

METRIC INSTRUCTIONAL PACKAGES UNDER DEVELOPMENT

AGRICULTURAL BUSINESS AND NATURAL RESOURCES	Alterations Specialist Homemaker/Health Aide Food Preparation Interior Design Assistant Baker Meat Cutting	Automotive Merchandising Petroleum Merchandising Transportation Soft Goods Merchandising
Agricultural Supplies/ Services Agricultural Production Agricultural Mechanics Horticulture Forestry	ENVIRONMENT CONTROL Waste Water Technology	PERSONAL SERVICES Cosmetology
BUSINESS AND OFFICE	ARTS AND HUMANITIES Broadcast Announcer Theatrical Costuming Stage Lighting Technology Technical Theater Assistant Assistant Theater Manager	TRANSPORTATION Small Engine Repair Diesel Truck Mechanics Auto Mechanics Aviation Electronics
Typist Clerk-Typist General Office Clerk Stenography Secretary Data Processing	HEALTH OCCUPATIONS Nurses Aide Nursing (A.A.) Licensed Practical Nurse Dental Assistant Dietetic Technician	PUBLIC SERVICE Fire Service Law Enforcement
COMMUNICATION MEDIA Composition Lay Out and Design Copy Preparation Offset Printing Press Operation Litho Photography Offset Stripping Offset Platemaking Blindery Operation Commercial Photography Mechanical Drafting Civil Drafting Architectural Drafting	HOSPITALITY AND RECREATION Recreation/Tourism Hotel and Lodging Food Services	
CONSTRUCTION Air Conditioning/ Refrigeration Heating Ventilating Plumbing Pipefitting Residential Electrician Industrial Electrician Commercial Electrician	MANUFACTURING Sheet Metal Welding/Cutting Tool and Die N/C Operator Metal Patternmaking Blueprint Reading Industrial Electronics Small Appliance Repair Major Appliance Repair Radio/TV Repair Audio Equipment Repair	
HOME ECONOMICS Child Care Aide Tailoring	MARKETING/DISTRIBUTION Hard Goods Merchandising Food Distribution	

APPENDIX C

Pilot Test Instrumentation

- A. Instructor's Questionnaire (Pre-instruction Form)
- B. Student Pretest
- C. Student Posttest
- D. Instructor's Questionnaire (Post instruction Form)

INSTRUCTOR'S QUESTIONNAIRE

for the package

"Metric Education for ()"

Introduction

The basic purpose of the evaluation, of which this questionnaire is a part, is to obtain your professional opinion regarding the quality of the indicated Metric Instructional Package. More specifically, the intent is to get your reactions, both good and bad, concerning that package and its associated materials and activities.

Your participation in the evaluation of these new instructional materials is very important. You are the sole source of any information regarding the workings of these materials with your students. Also, your class is one of only a very few groups that are involved in the total evaluation effort.

Before you begin filling out this questionnaire, there are several points which you should remember. First, your participation in this evaluation is voluntary and there is no penalty for non-participation. Second, you are encouraged not to respond to any item about which you feel reluctant. Finally, your name is requested only so we will be able to correctly match sets of data, e.g., this questionnaire and the POST-INSTRUCTION QUESTIONNAIRE; you will be asked to complete.

The Center for Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

1975

Part I: BACKGROUND DATA

The purpose of this set of items is to obtain some important background information about you and your students. Please answer each question as honestly and frankly as possible. Indicate your answers either by filling in the blanks or by circling the letter in front of the option provided which you feel is the best response.

1. NAME: _____
2. DATE: _____
3. ADDRESS: _____
4. CITY AND STATE: _____
5. How many hours of training in metric and metric education have you had prior to this time? (_____ hours)
6. Up to this point in your career, how many hours of experience have you had teaching the metric system? (_____ hours)
7. What are you?
 - A. Male
 - B. Female
8. How old are you? (_____ years)
9. What is your highest level of education?
 - A. High school
 - B. Some college
 - C. Bachelor's degree
 - D. Master's degree
 - E. Doctor's degree
 - F. Other (please explain) _____

Part II: GENERAL ATTITUDE

The items in this part of the questionnaire deal with your more generalized attitudes toward the metric system and metric education. Since there are no right or wrong answers, please respond to each item as honestly and frankly as you can.

ITEMS:	CHECK ONE PER ITEM				
	STRONGLY AGREE	AGREE	NO OPINION	DISAGREE	STRONGLY DISAGREE
10. If the United States keeps trading with other nations, it is important that we measure and sell goods in metric units.					
11. I feel it is very important that we all learn the metric system immediately.					
12. We haven't changed to the metric system yet, and there probably won't be much need for us to do so in the near future.					
13. A working knowledge of the metric system would be very helpful to me in my personal life (for example, when shopping for food or working around my home.)					
14. Knowing the metric system would be very helpful to me in my job.					
15. Its very unusual for me to ever hear or read about anything that involves using metric units.					
16. I believe the United States will convert to the metric system a great deal more rapidly in the next five years.					
17. I try to use the metric system and metric units whenever possible.					
18. Only people in certain special jobs will ever need to know the metric system.					

STUDENT TEST BOOKLET

for

"Metric Education for ()"

Introduction

The purpose of this test is to help us evaluate and improve a new set of instructional materials. You are one of the few sources of information we have regarding the workings of those materials in an actual school setting. So, it is important that you do a good job and answer all the questions of this test as best as you can.

Before you begin to answer any of the test questions, there are several important things you should know about. First, your participation is voluntary and there is no penalty for non-participation. Second, you do not have to respond to any question about which you feel reluctant. Also, your name has been coded so we will be able to match sets of data. For example, your pretest and posttest.

The Center for Vocational Education

The Ohio State University

1960 Kenny Road

Columbus, Ohio 43210

Directions:

The first thing you should do is to make sure you have written your name on the special answer sheet provided.

This part of the test contains a number of multiple-choice questions. You are to read each question carefully. Then, you are to read each of the possible answers below the question. After that, pick the letter next to the answer you think is best. Use your pencil to mark the letter on your answer sheet.

The following example should help you understand what you are to do.

Example:

1. Which of the following is the name of a unit of length?

- [A] second
- [B] foot
- [C] pound
- [D] quart

Answer Sheet					
1	[A]	☒	[C]	[D]	[E]
2	[A]	[B]	[C]	[D]	[E]

Did you read the question? Did you read each of the possible answers below the question? Which answer is best?...Yes, a foot is a unit of length. So, the letter [B] is crossed out on your answer sheet.

Do you understand what you are to do? If you do not understand, raise your hand and your teacher will help you.

When you understand what to do, turn the page and answer the rest of the questions.

Part I - Directions:

The items in this part of the test concern your feelings and more general attitudes toward the metric system. There are no right or wrong answers. So please respond to each item as honestly and frankly as you can.

ITEMS:	CHOOSE ONE PER ITEM				
	STRONGLY AGREE	AGREE	NO OPINION	DISAGREE	STRONGLY DISAGREE
1. If the United States keeps trading with other nations, it is important that we measure and sell goods in metric units.	(A)	(B)	(C)	(D)	(E)
2. I feel it is very important that we all learn the metric system immediately.	(A)	(B)	(C)	(D)	(F)
3. We haven't changed to the metric system yet, and there probably won't be much need for us to do so in the near future.	(A)	(B)	(C)	(D)	(F)
4. A working knowledge of the metric system would be very helpful to me in my personal life (for example, when shopping for food or working around my home).	(A)	(B)	(C)	(D)	(E)
5. Knowing the metric system would be very helpful to me in my job.	(A)	(B)	(C)	(D)	(F)
6. It's very unusual for me to ever hear or read about anything that involves using metric units.	(A)	(B)	(C)	(D)	(F)
7. I believe the United States will convert to the metric system a great deal more rapidly in the next five years.	(A)	(B)	(C)	(D)	(F)
8. I try to use the metric system and metric units whenever possible.	(A)	(B)	(C)	(D)	(F)
9. Only people in certain special jobs will ever need to know the metric system.	(A)	(B)	(C)	(D)	(F)

PART II

10. One hundred twenty-five grams is about the mass of a:
- [A] new-born baby
 - [B] hamburger
 - [C] shoestring
 - [D] Volkswagon "Beetle"
11. The square metre is about the area of:
- [A] a postage stamp
 - [B] this sheet of paper
 - [C] a card table top
 - [D] a bedspread
12. Application rates of dry fertilizers for lawns are normally given in:
- [A] grams per square centimetre
 - [B] kilograms per square centimetre
 - [C] litres per square metre
 - [D] grams per square metre
13. The mass of bulk seeds is measured in:
- [A] cubic metres
 - [B] millilitres
 - [C] centimetres
 - [D] kilograms
14. The correct way to write twenty grams is:
- [A] 20 g
 - [B] 20 g.
 - [C] 20 gms
 - [D] 20 Gm.
15. The correct way to write twelve thousand millimetres is:
- [A] 12,000 mm
 - [B] 12,000 mm
 - [C] 12 000 mm
 - [D] 12 000 mm
16. A container having a volume of 1000 cubic centimetres would hold:
- [A] 100 litres
 - [B] 10 litres
 - [C] 1000 litres
 - [D] 1 litre
17. A container holding 1 millilitre has a volume of:
- [A] 1 cubic centimetre
 - [B] 1 cubic metre
 - [C] 1 cubic kilogram
 - [D] 1 square metre
18. Fifteen litres of water has a mass of:
- [A] 15 grams
 - [B] 150 kilograms
 - [C] 150 grams
 - [D] 15 kilograms
19. Ten millilitres of water has a mass of:
- [A] 10 kilograms
 - [B] 1 gram
 - [C] 1 kilogram
 - [D] 10 grams
20. A board 20 centimetres wide also has a width of:
- [A] 2000 millimetres
 - [B] 2 millimetres
 - [C] 200 millimetres
 - [D] 0.2 millimetres
21. A 750 gram sack of potting medium is the same as:
- [A] 0.75 kilograms
 - [B] 750 000 kilograms
 - [C] 7.5 kilograms
 - [D] 7500 kilograms

22. For measuring hectares you would use a:

[A] container
[B] tape
[C] pressure gage
[D] scale

23. For measuring kilopascals you would use a:

[A] scale
[B] container
[C] ruler
[D] pressure gage

24. Estimate the length of the line below:

[A] 8 centimetres
[B] 14 pascals
[C] 40 millimetres
[D] 23 grams

25. Estimate the length of the line below:

[A] 4 pascals
[B] 2 centimetres
[C] 23 milligrams
[D] 10 millimetres

Use this conversion table to answer questions 26 and 27.

m	ft	ft ²	m ²
1	10.76	1	0.09
2	21.53	2	0.18
3	32.29	3	0.28
4	43.06	4	0.37
5	53.81	5	0.46
6	64.58	6	0.56
7	75.35	7	0.65
8	86.11	8	0.74
9	96.87	9	0.84
10	107.64	10	0.93

26. Find the equivalent;
15 ft² is:

[A] 17.16 m²
[B] 2.6 m²
[C] 0.93 m²
[D] 1.3 m²

27. Find the equivalent;
15 m² is:

[A] 8.73 ft²
[B] 161.45 ft²
[C] 973.06 ft²
[D] 97.33 ft²

28. The metric unit which replaces the fluid ounce is:

[A] litre
[B] cubic metre
[C] millilitre
[D] gram

29. The metric unit which replaces the gallon is:

[A] litre
[B] kilogram
[C] cubic metre
[D] millilitre

30. One pint of herbicide would be about:

[A] 1 litre
[B] 24 centigrams
[C] 500 millilitres
[D] 150 millilitres

31. A nursery customer asks for a two-foot arborvitae. An equivalent tree in metric units would be about:

[A] 90 centimetres
[B] 30 centimetres
[C] 60 centimetres
[D] 15 centimetres

STUDENT TEST BOOKLET

for

"Metric Education for ()"

Introduction

The purpose of this test is to help us evaluate and improve a new set of instructional materials. You are one of the few sources of information we have regarding the workings of those materials in an actual school setting. So, it is important that you do a good job and answer all the questions of this test as best as you can.

Before you begin to answer any of the test questions, there are several important things you should know about. First, your participation is voluntary and there is no penalty for non-participation. Second, you do not have to respond to any question about which you feel reluctant. Also, your name has been coded so we will be able to match sets of data. For example, your pretest and posttest.

The Center for Vocational Education

The Ohio State University

1960 Kenny Road

Columbus, Ohio 43210

Directions:

The first thing you should do is to make sure you have written your name on the special answer sheet provided.

This part of the test contains a number of multiple-choice questions. You are to read each question carefully. Then, you are to read each of the possible answers below the question. After that, pick the letter next to the answer you think is best. Use your pencil to mark the letter on your answer sheet.

The following example should help you understand what you are to do.

Example:

1. Which of the following is the name of a unit of length?

- [A] second
- [B] foot
- [C] pound
- [D] quart

Answer Sheet

- | | | | | | |
|---|-----|-------------------------------------|-----|-----|-----|
| 1 | [A] | ☒ | [C] | [D] | [E] |
| 2 | [A] | [B] | [C] | [D] | [E] |

Did you read the question? Did you read each of the possible answers below the question? Which answer is best?...Yes, a foot is a unit of length. So, the letter [B] is crossed out on your answer sheet.

Do you understand what you are to do? If you do not understand, raise your hand and your teacher will help you.

When you understand what to do, turn the page and answer the rest of the questions.

Part I - Directions:

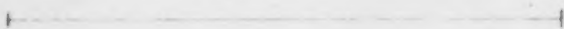
The items in this part of the test concern your feelings and more general attitudes toward the metric system. There are no right or wrong answers. So please respond to each item as honestly and frankly as you can.

ITEMS:		CHOOSE ONE PER ITEM				
		STRONGLY AGREE	AGREE	NO OPINION	DISAGREE	STRONGLY DISAGREE
1.	If the United States keeps trading with other nations, it is important that we measure and sell goods in metric units.	(A)	(B)	(C)	(D)	(E)
2.	I feel it is very important that we all learn the metric system immediately.	(A)	(B)	(C)	(D)	(F)
3.	We haven't changed to the metric system yet, and there probably won't be much need for us to do so in the near future.	(A)	(B)	(C)	(D)	(F)
4.	A working knowledge of the metric system would be very helpful to me in my personal life (for example, when shopping for food or working around my home).	(A)	(B)	(C)	(D)	(F)
5.	Knowing the metric system would be very helpful to me in my job.	(A)	(B)	(C)	(D)	(F)
6.	It's very unusual for me to ever hear or read about anything that involves using metric units.	(A)	(B)	(C)	(D)	(F)
7.	I believe the United States will convert to the metric system a great deal more rapidly in the next five years.	(A)	(B)	(C)	(D)	(F)
8.	I try to use the metric system and metric units whenever possible.	(A)	(B)	(C)	(D)	(F)
9.	Only people in certain special jobs will ever need to know the metric system.	(A)	(B)	(C)	(D)	(F)

PART II

10. A 750 gram sack of potting medium is the same as:
- [A] 0.75 kilograms
 - [B] 750 000 kilograms
 - [C] 7.5 kilograms
 - [D] 7500 kilograms
11. The metric unit which replaces the gallon is:
- [A] litre
 - [B] kilogram
 - [C] cubic metre
 - [D] millilitre
12. The metric unit which replaces the fluid ounce is:
- [A] litre
 - [B] cubic metre
 - [C] millilitre
 - [D] gram
13. For measuring hectares you would use a:
- [A] container
 - [B] tape
 - [C] pressure gage
 - [D] scale
14. A line 1.37 centimetres wide also has a width of:
- [A] 2000 millimetres
 - [B] 2 millimetres
 - [C] 200 millimetres
 - [D] 0.2 millimetres
15. The correct way to write twelve thousand millimetres is:
- [A] 12,000mm
 - [B] 12,000 mm
 - [C] 12 000mm
 - [D] 12 000 mm
16. The square metre is about the area of:
- [A] a postage stamp
 - [B] this sheet of paper
 - [C] a card table top
 - [D] a bedspread
17. A container having a volume of 1000 cubic centimetres would hold:
- [A] 100 litres
 - [B] 10 litres
 - [C] 1000 litres
 - [D] 1 litre
18. Ten millilitres of water has a mass of:
- [A] 10 kilograms
 - [B] 1 gram
 - [C] 1 kilogram
 - [D] 10 grams
19. One hundred twenty-five grams is about the mass of a:
- [A] new-born baby
 - [B] hamburger
 - [C] shoestring
 - [D] Volkswagon "Beetle"
20. The correct way to write twenty grams is:
- [A] 20 g
 - [B] 20 g.
 - [C] 20 gms
 - [D] 20 Gm.
21. The mass of bulk seeds is measured in:
- [A] cubic metres
 - [B] millilitres
 - [C] centimetres
 - [D] kilograms

22. Estimate the length of the line below:



- [A] 8 centimetres
- [B] 14 pascals
- [C] 40 millimetres
- [D] 23 grams

23. Estimate the length of the line below:



- [A] 4 pascals
- [B] 2 centimetres
- [C] 23 milligrams
- [D] 10 millimetres

24. For measuring kilopascals you would use a:

- [A] scale
- [B] container
- [C] ruler
- [D] pressure gauge

25. Application rates of dry fertilizers for lawns are normally given in:

- [A] grams per square centimetre
- [B] kilograms per square centimetre
- [C] litres per square metre
- [D] grams per square metre

26. Fifteen litres of water has a mass of:

- [A] 15 grams
- [B] 150 kilograms
- [C] 150 grams
- [D] 15 kilograms

27. A container holding 1 millilitre has a volume of:

- [A] 1 cubic centimetre
- [B] 1 cubic metre
- [C] 1 cubic kilogram
- [D] 1 square metre

Use this conversion table to answer questions 28 and 30.

m ²	ft ²	ft ²	m ²
1	10.76	1	0.09
2	21.53	2	0.18
3	32.29	3	0.28
4	43.06	4	0.37
5	53.81	5	0.46
6	64.58	6	0.56
7	75.35	7	0.65
8	86.11	8	0.74
9	96.87	9	0.84
10	107.64	10	0.93

28. Find the equivalent;
3 m² is:

- [A] .73 ft²
- [B] 161.45 ft²
- [C] 1.06 ft²
- [D] 32.33 ft²

29. One pint of herbicide would be about:

- [A] 1 litre
- [B] 24 centigrams
- [C] 500 millilitres
- [D] 150 millilitres

30. Find the equivalent;
14 ft² is:

- [A] 37.16 m²
- [B] 2.6 m²
- [C] 0.93 m²
- [D] 1.3 m²

31. A nursery customer asks for a two-foot arborvitae. An equivalent tree in metric units would be about:

- [A] 90 centimetres
- [B] 30 centimetres
- [C] 60 centimetres
- [D] 15 centimetres

Part III - Directions:

During the past several weeks, your class has been using some new instructional materials that deal with the metric system. The purpose of the items in this part of the test is to get your reactions concerning what you liked and didn't like about those materials.

It is extremely important that you answer each of the questions listed. Your comments and suggestions will be used directly to help improve materials and activities.

31. Think about the materials, activities, and other experiences related to the metric system which we have dealt with over the past several weeks. What one thing related to those experiences did you enjoy most?

32. What one thing related to our experiences with the metric system did you dislike most?

33. How do you think the problem you identified in question 32 can best be resolved or eliminated?

INSTRUCTOR'S QUESTIONNAIRE

for the Package

Metric Education for ()

Introduction

The basic purpose of the evaluation, of which this questionnaire is a part, is to obtain your professional opinions regarding the quality of the indicated Metric Instructional Package. More specifically, the intent is to get your reactions, both good and bad, concerning the Package and its associated materials and activities.

Your participation in the evaluation of these new instructional materials is very important. You are the sole source of any information regarding the workings of these materials with your students. Also, your class is one of only a very few groups that are involved in the total evaluation effort.

Before you begin filling out this questionnaire, there are several points which you should remember. First, your participation in this evaluation is voluntary and there is no penalty for non-participation. Second, you are encouraged not to respond to any item about which you feel reluctant. Finally, your name is requested only so we will be able to correctly match sets of data, e.g., this questionnaire and the PRE-INSTRUCTION QUESTIONNAIRE you were asked to complete earlier.

The Center for Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

1975

NAME: _____

DATE: _____

Part I: General Attitude

The items in this part of the questionnaire deal with your more generalized attitudes toward the metric system and metric education. Since there are no right or wrong answers, please respond to each item as honestly and frankly as you can.

CHECK ONE PER ITEM

	strongly agree	agree	no opinion	disagree	strongly disagree
1. A working knowledge of the metric system would be very useful to me in my personal life (for example, when shopping for food or working around my home).					
2. We haven't changed to the metric system yet, and there probably won't be much need for us to do so in the near future.					
3. It is very unusual for me to ever hear or read about anything that involves using metric units.					
4. If the United States keeps trading with other nations, it is important that we measure and sell goods in metric units.					
5. I feel it is very important that we all learn the metric system as soon as possible.					
6. I believe the United States will change to the metric system a great deal more rapidly in the next five years.					
7. Knowing the metric system would be very helpful to me in my job.					
8. Only people in certain special jobs will ever need to know the metric system.					
9. I try to use the metric system and metric units whenever possible.					

Part II: GENERAL CONCERNS AND ISSUES

The purpose of this set of items is to obtain your reactions toward several more general issues and concerns related to this instructional package.

You are to indicate your response to each item either by filling in the blanks or by circling the letter in front of the option provided which best expresses your feelings. You are also encouraged to express any comments or reservations you may have regarding the topics considered in the spaces provided.

If additional ~~room~~^{space} is needed, feel free to write on the back of the page.

10. Were you prepared to teach the package?

- A. Yes, even before the related in-service training.
- B. Yes, after receiving the in-service training.
- C. No, I was not as prepared as I would have liked.
- D. No, I was uncomfortable teaching to package.

11. About how many total hours of actual classtime did you spend covering the materials in this package? (_____ hours).

12. On the average, how long was each session during which time you used the materials in this package? (_____ hours).

13. Did you use the materials in the package exactly in the order in which they are organized?

- A. Yes
- B. No (Please explain the changes you made!) _____

14. Are there any students for whom you would not recommend the use of this package?

- A. No
- B. Yes (Please describe the types of students!) _____

15. How appropriate were the materials, examples, etc. used in the package for your course?

- A. Very appropriate
- B. Somewhat appropriate
- C. Very inappropriate

COMMENTS:

16. Would you use this Metric Instructional Package again?

- A. Yes, without any changes being made on it.
- B. Yes, but only if a few important changes are made in it.
- C. Yes, but only if major changes are made in it.
- D. No

17. Would you recommend this package to other teachers?

- A. Yes, quite strongly
- B. Yes, somewhat
- C. Yes, but not very strongly
- D. No.

18. Overall, how would you rate the quality of this package?

- A. Excellent
- B. Very Good
- C. Good
- D. Average
- E. Poor

COMMENTS:

19. The directions for using this package were clearly written and complete.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

20. The "Metric Content" contained in the package was clearly written.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

21. The section, "Teaching and Learning Metric in () Occupations", is clearly written and complete.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

22. Generally speaking, the "Metric Content" contained in the package was written at an appropriate level for most elementary students.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

23. Teaching the materials in this package took up too much time.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

24. The organization or format of the package facilitated the instructional process and made it easier

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

25. As we were going through these materials, I found that the students had difficulty "thinking metric".

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

26. I feel this package will fit very well into my regular instructional program.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

27. In the spaces below, describe the two things you liked most about this package.

(A) First:

(B) Second:

Part II: SPECIFIC CHANGES AND MODIFICATIONS:

During this part of the questionnaire please answer each of the following questions as they pertain to each of the specified parts of the instructional package which you used. Your responses to these questions are very important.

SPECIFIC PARTS OF THE PACKAGE	HOW WOULD YOU RATE EACH PART OF THE PACKAGE IN TERMS OF ITS USEFULNESS	WHAT ONE MAJOR PROBLEM DID YOU SEE IN EACH PART OF THE PACKAGE, AND HOW WOULD YOU SUGGEST THAT PROBLEM BE ALLEVIATED OR RESOLVED?
21. Objectives	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	a. Problem: _____ b. Suggested Resolutions: _____
22. Learning Activities	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	a. Problem: _____ b. Suggested Resolutions: _____
23. Metric Content	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	a. Problem: _____ b. Suggested Resolutions: _____
24. Goal Aids	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	a. Problem: _____ b. Suggested Resolutions: _____
25. Student Exercises	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	a. Problem: _____ b. Suggested Resolutions: _____
26. Metric References	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	a. Problem: _____ b. Suggested Resolutions: _____
27. In-Service Training	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	a. Problem: _____ b. Suggested Resolutions: _____
28. Student Tests	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	a. Problem: _____ b. Suggested Resolutions: _____

STATES WHOSE STATE BOARDS OF EDUCATION PASSED THE METRIC RESOLUTIONS
TO METRICATE

<u>STATE</u>	<u>DATE</u>
Alabama	1973
Arizona	1973
California	1973
Connecticut	
Delaware	1974
Hawaii	1974
Idaho	1973
Maine	1974
Maryland	1973-74
Massachusetts	
Michigan	1973
Nevada	1973
New Hampshire	1974
New Jersey	1973
New York	1975
North Carolina	1974
Ohio	1974
Oregon	1974
Pennsylvania	1974
Vermont	1974
Virginia	1974
West Virginia	1975
Wisconsin	1974
Wyoming	1974

APPENDIX IV-G

Follow-up Letters to State Directors



THE CENTER FOR VOCATIONAL EDUCATION

The Ohio State University • 1960 Kenny Road • Columbus, Ohio 43210
 Tel. (614) 486 3655 Cable: CTVOCEDOSU/Columbus, Ohio

Thank you very much for being willing to participate as a field test site for our Metric Education Instructional Packages.

Inside the accompanying folder you will find five items:

- 1) the field testing process
- 2) the list of selection criteria
- 3) a brochure which describes our project
- 4) a list of forms for characterizing schools
- 5) a list of the seventy-seven (77) metric instructional packages which are printed on the third page of the folder.

We are trying to locate secondary and post-secondary vocational schools in close proximity to each other which offer all of the programs with the exception of Wastewater Technology. The Arts and Humanities programs may be offered by a high school or a post-secondary community college which is not necessarily vocational.

We have enclosed forms with which to characterize each school and would appreciate having a sheet filled out for those schools which you feel would be appropriate. When we receive the information from you, we will then be able to determine the classes in which schools would be most suitable for field testing purposes. At that time, with your permission, we would like to contact the local Superintendent of Schools and the principals.

It is imperative that we start teacher inservice training during the first two weeks of March. Therefore, we would appreciate hearing from you at your earliest convenience. We will call you next week to verify your participation.

Sincerely,



Gloria Cooper
Co-director
The Metric Education Project

Joel Magisos
Joel Magisos
Co-director
The Metric Education Project

GC:DJJ
Enclosures

Field Testing Process

When:	Field-testing will take place between March 15 and April 9, 1976. Participating schools are free to choose any five or six contact hours during the period which is most convenient for them.
Amount of time needed for:	Participating classroom teachers will need six contact hours over a two-day period prior to classroom use of the materials.
Teacher training	Three hours for general metric instruction. Two hours for vocational metric instruction. One hour for instruction on administering the pretest and post-test.
Classroom use of metric package	Five to six classroom contact hours (45-50 minute sessions).
Administering tests	Approximately 20 - 30 minutes for the pretest. Approximately 20 - 30 minutes for the post-test.
Where:	Metric Project Staff will conduct workshops for teachers at a central local site.
How:	Due to project funding constraints, we are asking: 1) that released time for teachers be provided by the participating educational agency. 2) that the local school duplicate student exercises, visuals and tables for classroom use. 3) that the local agency provide the metric equipment for classroom use.
The Metric Project will provide:	1) one instructional package for each participating teacher. 2) inservice training in metric for participating teachers. 3) resource materials for each participating classroom.

Selection Criteria

Metric Package Characteristics

Selection criteria are intended to meet the following characteristics of the metric instructional packages which were designed for:

1. Vocational programs grades 10-14, with the exception of the Arts and Humanities Cluster which contains programs not usually included in the category VOCATIONAL.
2. Programs where there is a need to metricate.
3. Infusion into ongoing, regular programs.
4. Students who already know the terminology, tools and equipment unique to the given program.
5. Students who already know the measurement skills used in the given program.

Selection Criteria

1. Programs shall be vocational, Part B reimbursable.
2. Programs shall be offered at a grade level between grades 10 through 14. (Secondary/Post-secondary)
3. The superintendant of the LEA and principal of the participating school will approve participation in the field testing.
4. The participating class will contain no less than fifteen students nor more than thirty students.
5. The program will be a "regular" program.
6. Students in the program will have mastered the terminology, tools, and equipment unique to that program.
7. Students will already know the measurement skills presently used in the given program.
8. The program will provide its own metric equipment.
9. The participating teachers will be given released time to attend a metric workshop for vocational education.
10. The participating school will be able to duplicate exercise sheets, visuals, and tables from the instructional packages for classroom use.

SCHOOL CHARACTERISTICS BY PROGRAM

This is an explanation of the categories on the attached forms.

Course: taught as a separate course

Program: taught as part of a one or two year program

Number of
sections: please enter the number of sections for the course
 or program

Number of
teachers: please enter the number of different teachers teaching
 this program or course

Grades: please enter the grade levels, whether grades 10, 11,
 12 at the secondary level or grades 13 or 14 at the post-
 secondary level

School _____	Superintendent of Schools _____	Principal _____
Address _____	Address _____	Telephone _____
Telephone _____		

	Course	Program	Number of sections	Number of teachers	Grades
AGRI-BUSINESS AND NATURAL RESOURCES					
01.0100	Agricultural Production				
01.0200	Agricultural Supplies & Services				
01.0300	Agricultural Mechanics				
01.0500	Horticulture				
01.0700	Forestry				
BUSINESS AND OFFICE					
00.0000	General Office Clerks				
14.0202	Data Processing				
14.0702	Secretaries				
14.0703	Stenography				
14.0901	Clerk-Typists				
14.0902	Typists				
ARTS AND HUMANITIES					
	Broadcast Announcing				
	Theatrical Costuming				
	Stage Lighting Technology				
	Technical Theater Assistants				
	Assistant Theater Managers				
COMMUNICATION MEDIA					
17.1300	Architectural Drafting				
17.1300	Civil Drafting				
17.1300	Mechanical Drafting				
17.1900	Commercial Photography				
17.1901	Type Composition				
17.1901	Layout and Design				
17.1902	Copy Preparation				
17.1902	Offset Printing Press Operation				
17.1903	Litho Photogra				
17.1903	Offset Stripping				
17.1903	Offset Litho Platemaking				
17.1906	Bindery Operation				

		Course	Program	Number of sections	Number of teachers	Grades
CONSTRUCTION						
17.0100	Air Conditioning & Refrigeration					
17.0102	Heating					
17.0103	Ventilating					
17.1002	Residential Electricity					
17.1007	Plumbing					
17.1007	Pipefitting					
17.1401	Industrial Electricity					
17.1499	Commercial Electricity					
HOME ECONOMICS						
09.0200	Alterations Specialists					
09.0200	Tailoring					
09.0201	Child Care Aides					
09.0203	Food Preparation					
09.0204	Interior Design Assistants					
09.0205	Homemaker and Health Aides					
17.2901	Bakers					
17.2903	Meat Cutting					
ENVIRONMENTAL CONTROL						
16.9902	Wastewater Technology					
HEALTH OCCUPATIONS						
Dietetic Technicians						
07.0101	Dental Assistants					
07.0301	Nursing (RN)					
07.0302	Licensed Practical Nurse Nursing					
07.0303	Nurses Aides					
HOSPITALITY AND RECREATION						
04.0700	Food Services					
04.1100	Hotel and Lodging					
04.1800	Recreation & Tourism					

	Course	Program	Number of sections	Number of teachers	Grades
MANUFACTURING					
Numerical Control Operators					
17.0200	Small Appliance Repair				
17.0200	Major Appliance Repair				
17.0500	Blueprint Reading				
17.1502	Industrial Electronics				
17.1503	Audio Equipment Repair				
17.1503	Radio-TV Repair				
17.2305	Sheet Metal Working				
17.2306	Welding & Cutting				
17.2307	Tool & Die Making				
17.2309	Metal Patternmaking				
MARKETING AND DISTRIBUTION					
04.0200	Soft Goods Merchandising				
04.0800					
04.0300	Automotive Merchandising				
04.0300	Hard Goods Merchandising				
04.0800					
04.0900					
04.1000					
04.0600	Food Distribution				
04.1600	Petroleum Marketing				
04.1700	Transportation				
PERSONAL SERVICES					
17.2602	Cosmetology				
TRANSPORTATION					
17.0302	Auto Mechanics				
17.0400	Aviation Electronics				
17.1200	Diesel Truck Mechanics				
17.3100	Small Engine Repair				
PUBLIC SERVICE					
17.2802	Law Enforcement				
17.2901	Fire Service				

APPENDIX IV-H

List of Sites and Dates
for
Vocational-Technical Field-test Workshops

1. April 14, 1976. Gloria Cooper, Joel Magisos, Ed Hauck and Tom Stiger conducted a one-day inservice workshop in Lexington, Massachusetts for the teachers participating in the field testing of metric materials. Approximately forty seven teachers were present as well as twelve observers from Region 1, the State Department of Education and various vocational service centers.
2. April 18-22, 1976. Joel Magisos and Edward Hauck travelled to Anchorage, Alaska to conduct a four-day workshop to inservice the teachers at that test location who were participating in the field testing of the metric instructional packages. Members of the Staff Development Center in Anchorage attended as did several from the Anchorage Career Development Center. College credits were extended by Alaska Methodist University to the participants of the workshop.
3. April 22, 1976. Gloria Cooper and Tom Stiger conducted a one-day workshop in Fond du Lac, Wisconsin for forty vocational educators who were being inserviced in metric field testing procedures. Those present included several persons from the Wisconsin Board of Vocational, Technical and Adult Education.
4. April 26-27, 1976. Gloria Cooper and Ed Hauck conducted a two-day metric inservice workshop for California teachers participating in the metric field testing.
5. April 28, 1976. Gloria Cooper and Edward Hauck travelled to Phoenix, Arizona to inservice the teachers from Arizona who were to participate in the metric instructional material field testing.
6. May 1, 1976. Gloria Cooper, Edward Hauck and Tom Stiger conducted a one-day metric inservice program for Philadelphia teachers at the John F. Kennedy Occupational Center. Fifty-three teachers who were to participate in the field testing of metric instructional packages attended, as did several school district supervisors.

7. May 6, 1976. Edward Hauck and Tom Stiger conducted a metric inservice workshop in Portland, Oregon at the Oregon State University Career Education Personnel Development Center for Oregon teachers participating in the metric field test.
8. May 7, 1976. Edward Hauck conducted an inservice workshop for California teachers at the North Orange County Regional Occupational Program Center. Sixteen teachers participating in the Metric Education Project field test attended as did members of the California and Orange County Departments of Education.
9. May, 1976, Edward Hauck and Gloria Cooper conducted a metric inservice workshop at The Center for Vocational Education for fire service training personnel.

APPENDIX IV-I

Workshop Training Materials

THE METRIC EDUCATION PROJECT

The Metric Education Project was established at The Center for Vocational Education in July 1974 under a three-year contract with the U.S. Office of Education. The purpose of the project is the "development and utilization of metric education instructional materials in vocational, technical, and adult education."

Major Project Activities

The project's initial task was to identify metric instructional and and reference materials and prepare an annotated bibliography. Metric Education: An Annotated Bibliography for Vocational, Technical and Adult Education, contains 369 citations, each giving information about the content and methods, educational level, price and complete ordering address. It is available through the Product Utilization section of the Center for Vocational Education.

Project staff have prepared a publication, Metric Education, A Position Paper for Vocational Technical and Adult Education, which describes problems, issues, and alternatives involved in developing and implementing metric education programs. This is also available through the Product Utilization Section.

We are presently developing and testing 77 metric instructional packages for selected occupations in the 15 occupational clusters, and preparing instructional packages for Adult Basic Education teachers and students.

In the future, Project staff will be conducting training workshops for selected vocational and adult education participants in each of the 10 USOE regions.

Finally, we will develop an implementation guide for infusing the metric education packages into local vocational and adult education programs based on the field trial experiences and information gained from the training workshops.

Project activities involve a wide range of individuals and groups representing the views of business and industry, vocational education, adult education, metric groups, Government, mathematics education, trade associations, and metric materials developers and suppliers.

How the Instructional Materials Were Developed

Experienced classroom teachers helped prepare the packages. Other metric consultants, and metric coordinators for business and industry were contacted about metric practices and the metric changeover. Their input was incorporated in the materials which are now ready for classroom try-out.



PURPOSE OF THE FIELD TEST

At the Center for Vocational Education we believe that the experienced, informed teacher is best qualified to select and evaluate materials and subject content to use with their students. And, that teachers who have used the materials in their classrooms can provide valuable information for revising and improving the materials.

You will be asked to provide information about the::

- 1) objectives
- 2) learning activities
- 3) measurement tasks, tools, and content
- 4) vocabulary and reading level
- 5) visual aids
- 6) student exercises
- 7) references
- 8) in-service training
- 9) student tests

We will ask you to identify any problems you or your students encounter with the materials, suggest how the problems might be resolved, and how the materials can be improved. We also need to know what works well, and how you adapt the materials to your classrooms, program areas, and students.

We realize that in some cases you will be using the materials somewhat in advance of the students real "need to know". Some program areas may not be affected immediately by the metric changeover. We recognize and appreciate the adjustments you will be making in your long-range classroom plans so that you and your students can assist us in improving the materials--to benefit many other teachers and students. We also believe that you and your students will enjoy and profit from the experience.

THE FIELD TEST PROCEDURE

A. PREPARATION

1. Examine the Metric Instructional Package for your occupation.
2. Locate or assemble the materials.
3. Plan the lessons (refer to the Suggested Lesson Plans which are provided).
4. Reproduce the materials needed.
5. Schedule the classroom trial (six-to-nine classroom hours). Keep an actual record of testing activities and lessons on your Field Test Calendar.
6. Obtain Test Scoring Pencils, one for each student.

B. ADMINISTER THE STUDENT PRE-TEST (FORM A)

1. Number the Student Pre-Test (Form A) test booklets consecutively, beginning with the number 1 and continuing through the number of students you have who will be participating in the Field Test.
2. Assign a Form A Student Test Booklet number to each student. Record in your record book (the same booklet number MUST be used by each student for the Student Posttest, Form B).
3. Distribute the numbered test booklet, an Answer Sheet, and a scoring pencil to each student.
4. Go over the Student Test Booklet Introduction with the students.
5. Have the students write their test booklet number on the bottom right-hand corner of the Answer Sheet in the space labeled "NUMBER ____." THIS IS THE ONLY IDENTIFICATION THEY WILL WRITE ON THE ANSWER SHEET.
6. After completing the test, collect the Form A Student Test Booklets, the Answer Sheets and the pencils.
7. Fill out the Student Data Form. Under Student Code, write only the student's Test Booklet number. Then go on to provide Student Data about their Sex, Background, Reading Skills, Measurement Skills, Knowledge of Occupational Terminology, and Math Skills. Use the information you have to make your best judgment.



8. Place the Student Test Booklets, Answer Sheets, and the Student Data Form, in the pre-paid envelope. Fill out the Summary Sheet on the outside of the envelope, and MAIL.

C. TEACH THE METRIC EDUCATION UNIT

D. ADMINISTER THE STUDENT POSTTEST (FORM B)

1. Number the Student Post-Test (Form B) test booklets consecutively, beginning with the number 1 and continuing through the number of students you have participating in the Field Test.
2. Important. Check your record book to find the proper Test Booklet Number for each student. (The Form B Test Booklet Number given to each student must be the same as the number that student used in the Pre-Test (Form A).
3. Distribute the correctly numbered Test Booklets to each student, along with an Answer Sheet and a scoring pencil.
4. Have the students write their test booklet number on the bottom right-hand corner of the Answer Sheet in the space labeled "NUMBER ____." THIS IS THE ONLY IDENTIFICATION THEY WILL WRITE ON THE ANSWER SHEET.
5. Go over the Student Test Booklet Introduction with the students.
6. After completing the Posttest, collect the Student Test Booklets, and the Answer Sheets.

E. COMPLETE AND MAIL THE POST-INSTRUCTION MATERIALS

1. Student Absences Not Made-up. Look through your student record book. If there are students who had absences during Metric Education instruction which could not be made-up and these absences are likely to adversely affect their performance on the Student Posttest, write ABSENT in the space below the space labeled "CAMPUS ____" on the bottom right-hand margin of their Answer Sheet.
2. Complete the Post-Instruction Form of the Instructors' Questionnaire.
3. Place the Student Test Booklets, Answer Sheets, and Post-Instruction Instructor's Questionnaire, and Field Test Calendar, in the pre-paid envelope. Fill out the Summary Sheet on the outside of the envelope and MAIL.
4. Give yourself a pat on the back for your efficiency, dispatch, and professional leadership.

NOTE: YOUR LAST DAY TO ADMINISTER THE STUDENT PRE-TEST IS _____.

YOUR LAST DAY TO ADMINISTER THE STUDENT POSTTEST IS _____.

If you have any questions, please call Metric Education Project 1-(614)486-3655

THE METRIC INSTRUCTIONAL PACKAGE

You will be given two forms of the metric instructional package. One is a general package, Metrics for Everyday Use, which has been developed so that we can work together in the workshop. The second, which you will receive later in the workshop and have an opportunity to examine in depth, is the Occupational Package you will be using in your classroom. It is very similar to the first package, but it is occupationally specific in the metric units and the exercises.

We will use the first package in the workshop to model and simulate the use of the package. Time will be condensed in the workshop simulation. More time will be desired for the learning activities in the classroom.

We want you to use the metric instructional package freely with your students during the field trial. However, we must ask you not to duplicate the materials to share with other teachers or friends. Since the materials are a field-test version which will be revised and distributed at a later time we ask you to observe our contract conditions.

The metric instructional package in the field-trial version is about 18 pages long. It includes one page of background information for the teacher on the structure of the package, suggestions on teaching metrics, and suggestions for using the materials.

Materials within the package are organized around the major objectives and the student exercises. There are six student exercises clustered around the four major objectives.

The learning activities can be completed within six to nine classroom periods of 45 - 50 minutes. Some additional time will be required to

administer the pre-test and post-test. About 20 - 30 minutes for each.

As you can see, under each major objective there is a Suggested Teaching Sequence. We wish to emphasize the word "Suggested." You will want to look through the materials and the exercises, and adapt the use of the materials to suit your particular needs and those of your students.

You will note that we have suggested using a section of the test in the instructional package to assess student performance after each student exercise. However, the test items which will appear in the revised version are not included in the Field Test version. They will be used in the Pre-test and Post-Test Data Collection.

You may examine the package briefly at this time. As we work together in the workshop, you will have an opportunity to examine each section in depth.

THE METRIC LEARNING ACTIVITIES

As we simulate each learning activity in the workshop, we will briefly describe the purpose of each objective and the sub-objectives.

1. Think Metric, Trying Out Metric Units, Objective 1, Lesson 1, Activity A

A. INTRODUCTION

Objective 1. Under Objective 1, "recognizing and using metric units, terms, and symbols," there are three sub-objectives. The first is "Given a metric unit, state a physical referent."

With the metric changeover, students need to know that a millimetre is a unit with a particular size. And, a certain number of millimetres is about so long. They need to be able to look at a metric value, such as 100 millimetres and attach meaning to it, or look at a measurement situation and attach a metric value to it, e.g., I need a bolt about 100 millimetres long. So we want the student to have a good physical referent in mind for a millimetre--a paper clip wire thickness; or for 100 millimetres--about the width of a palm, just to begin to get a handle on the size of a metric unit or value. Making a comparison of parts or quantities in mind for specific metric units or values will help give students a mental reference to which they can relate metric values. They will develop others as they continue working with metric units.

Objective 2. The second sub-objective states that when a student recognizes a measurement task, she or he will recognize the kind of metric units to be used. Fabric length is measured in metres. Quantities of liquid less than a litre are measured in millilitres. Common temperatures are measured in degrees Celsius. The previous experience, plus Table 2 and Exercise 2 will be used.

Objective 3. The third sub-objective states that the student will be able

to write in metric units using the rules of notation. This objective provides for both reading and writing metric units. The information sheets, exercises and tables provide information and practice in reading and writing metric units, terms, and symbols.

B. DIRECTIONS

We are going to allocate one and one-half hours of the workshop for this activity. Two to three 45-minute periods should be used in the classroom. You will want to move to the learning stations and proceed as quickly as possible. For this activity, you will need Information Sheet No. 1 and Exercise No. 1 of your unit Metrics for Everyday Use, and you will pick up a Measurement Activity Sheet as you move through each of the Learning Stations.

We hope that those of you with more experience with metric units will assist others and describe the personal experiences and cues you use to relate to metric quantities.

C. ACTIVITY - Measurement Activities, Resource Tables

D. FOLLOW-UP TO MEASUREMENT ACTIVITIES

Modelling the Use of Table 1 and Visual No. 2.

- a. Ask participants to describe useful referents for metric units which they have found (Table 1 can be used in this discussion).
- b. (Display Visual No. 2 on the overhead projector. Ask several participants to share temperature readings for room temperature (or hot tap water). Add the information to the visual by drawing the range of temperatures or adding the information with a grease pencil. Discuss why they may have gotten different readings. Recall that measurements are always approximate, not exact. Ask one or

more participants to mention a temperature that might appear on this thermometer which is critical in their occupation but is not shown here. Add this information with the grease pencil and mention how that information could be added to the duplication master before reproducing it for classroom use.

E. FILM, MEASURING WITH METERS (22 - 30 minutes)

1. INTRODUCTION. Mention that of many films we have viewed, this one does a good job of: a) matching physical referents with metric units, b) showing how the units and symbols are written, c) demonstrating the ease of calculation; and d) presenting metric equivalents and relationships in meaningful ways.

2. FILM VIEWING

3. FOLLOW-UP

1. Ask whether they found the film enjoyable, meaningful, and useful for their students.
2. Note that we have found it informative when viewed a second time.
3. Note that the terms "dekametre" and "decimetre" were dropped in later calculations in the film.
4. Note the spelling metre vs. meter (either is correct) and defuse the issue.
5. Discuss the "think metric" approach in contrast to the "conversion" approach.

II. What Metric Unit Will You Use?, Objective 3, Lesson 2.

A. INTRODUCTION. We are going to allocate only 15 minutes for this activity in the workshop. You may want to use as much as 30 minutes or more in your classroom. We will work in small groups. Will someone quickly assume the role of group leader? You can refer to Table 2 and your previous experience

with metric units to respond to the examples in Exercise No. 2. You may want to skip around in the examples in order to work with unique examples.

B. ACTIVITY

C. FOLLOW-UP

(Brief question period in large group follow-up)

III. Metric to Metric Equivalents and Relationships, Lesson 2

A. INTRODUCTION

Objective 2. The second major objective is "recognizing and using metric equivalents and relationships." The focus on metric equivalents prepares the students to work with the multiples and sub-multiples of metric units with ease and facility. A kilometre is 1000 metres; there are 100 centimetres in a metre, and ten millimetres in a centimetre. The focus on metric relationships shows how the metric units for length, volume and mass are related. It prepares the student to calculate volume and capacity, and estimate or calculate mass--based on knowledge of the volume or capacity. You may want to extend this section to include more information on looking up and using specific gravity of materials used in your occupation--if this is required or useful information for entry-level workers in your occupational area.

B. DIRECTIONS

The metric system is a decimal or base 10 system like our number system in our country. Changing to larger or smaller units will usually be based on tens, hundreds, or thousands.

You may want to review with your students, multiplying and dividing a value by ten, one hundred, and one thousand and show how the numbers are moved to other place value positions in relation to the decimal point. We believe that your students will quickly learn to multiply or divide mentally by 10, 100, and 1000 when changing to larger or smaller units.

We would like you to note the stress on the three prefixes kilo, centi, and milli on Visual No. 1. These three prefixes will meet most needs, and they are easy to learn. Students should know about the other prefixes but no attempt should be made to memorize them. The students will gain ease and facility with these and other prefixes used in their occupations as they work with the units.

A can of fruit may be marked 494 millilitres or 0.49 litre. A student or worker may need a bolt which is 6 centimetres long. However, bolts will be marketed only in millimetre lengths, so a 60 millimetre bolt will be what is needed. The medical profession may continue to use cc. (cubic centimetre) for some time instead of cm³ or the millilitre--the equivalent which is preferred. Students, teachers, and consumers can develop the ability to take these things in stride.

We will use about 30 minutes for this activity in the Workshop. You may want to allocate from 30 - 45 minutes in the classroom.

For this activity you will need Visuals No. 1 and 3, Information Sheet 2, and Exercise No. 3.

You will want to work through the rules and examples in Items 1 - 6, complete or test examples from Item 7, and complete Item 8. We will ask one person to complete Item 9 for us.

A. ACTIVITY

B. FOLLOW-UP

Questions and discussion of Item 9, (specific gravity).

IV. Which Tools for the Job and Measuring Up, Lesson 3

INTRODUCTION

Objective 1. The third major objective is "recognizing and using the appropriate instruments, tools, and devices for measurement tasks in the occupation."

1. One sub-objective is "to be able to distinguish between metric and Customary tools." During the transition period both metric and Customary tools and devices may be around for some time. Can you imagine the mechanic picking up a Customary wrench instead of metric, crawling under the car, and discovering he or she has the wrong tool. Or, taking a tape measure out on the job, or up on a roof, to make a measurement only to discover you have the wrong tape. Or reading a quantity on a scale as ounces when it is grams (at 30 to the ounce) or vice-versa.

Other than inconvenience, incorrect estimates, wasting materials, or over- or under-ordering supplies, there are potential safety hazards. Trying to put 210 pounds per square inch of pressure in a tire, designed for 210 kilopascals (about 30 pounds per square inch) could cause an explosion.

2. A second sub-objective has the student select and use the proper tool or instrument for a measurement task in the occupation.

3. The third sub-objective is to have the student attain reasonable accuracy in estimating metric quantities for on-the-job tasks, and measure to the level of accuracy required for acceptable job performance.

A. Which Tools For the Job?

1. INTRODUCTION.

We are much more limited in the tools and instruments which are available here for this activity than you will be in your classroom setting.

Because you may have few metric tools and devices in your classrooms as you begin the metric changeover, this activity may seem to be too limited. However, as you acquire additional metric tools, devices, and materials it will become a more challenging teaching and learning task. Even though

you may not have pressure gages in kilopascals, torque wrenches in newton-metres, or metric micrometers, students can be prepared to anticipate these changes.

2. DIRECTIONS.

We have prepared a display of metric and Customary tools and instruments and will ask some participants to role play as students, examine some tools and instruments and describe some distinguishing characteristics.

Each student should have the opportunity to personally examine the tools and devices. It may be useful to have students work in pairs or small groups; to share and compare their observations, and supply corrective feedback to each other. One thing they will want to note is the markings and measurement unit graduations on the instruments.

We have allocated 30 minutes for this experience in the Workshop. You will want to plan for a full period in the classroom.

3. ACTIVITY. Which Tools for the Job?

Small Group Activity with Exercise 4 (15 minutes).

4. FOLLOW-UP

Recess question and discussion period in Large Group Follow-up.

5. Measuring Up In Everyday Tasks

INTRODUCTION

Directions-Exercise 5. In earlier experiences in the unit, the student was principally involved in trying out metric units in relation to common objects. This activity focuses on applying estimation and measurement skills to occupational tasks. You will need Exercise 5, "Measuring Up In Everyday Tasks" from your unit Metrics for Everyday Use.

Again, we are going to ask you to work as individuals in small groups. We will allocate 30 minutes for this activity in the workshop. Perhaps one to two periods could profitably be used in the classroom. We will ask each small group to complete two or three of the activities.

2. ACTIVITY, Measuring Up.

3. FOLLOW-UP.

Large group follow-up (5 - 10 minutes).

(Reports on findings from the Small Group Assignments).

V. Metric-Metric Equivalents, Objective 4, Lesson 4,

A. INTRODUCTION

Objective 4. The final major objective recognizes that during the metric changeover period, vocational-technical workers will need to be comfortable and conversant with both measurement systems. The transition period could extend over 10, 20 or 30 years for durable goods such as housing or heavy machinery and equipment. Suppliers will not all change to metrics at the same time. Goods on shelves or in inventory may be either Customary or metric. Inventories will need to be used up. Durable goods built to Customary standards will need to be serviced and maintained. Dual inventories will be maintained in some cases.

Some middle and technical workers are "go-betweens;" between customers and suppliers, managers and workers, professionals and unskilled workers, one specialized source and another.

The first sub-objective states that given a Customary or metric measurement, the student will be able to find the equivalent on a conversion table. Extensive conversion formulas and mathematics will not be required. Conversion tables will be available from government and industry sources or

commercial suppliers. Students will need to be able to use them accurately.

The second sub-objective states that the student will be able to state the metric unit which replaces a Customary unit. This will make it possible for them to select appropriate conversion tables and communicate effectively with others during the transition period.

The third sub-objective states that when a student is given a metric or Customary amount, he or she will be able to state an approximate Customary or metric amount--particularly for common quantities. We believe workers can be more effective when they know the approximate metric amount for a customary amount and vice-versa. When a customer asks for a pint of paint thinner or rubber cement, or a person submits a requisition for a pint of something, and a supplier has converted to metric sizes or packaging, our vocational-technical graduates should be able to reach for, or order, a 500 millilitre container--perhaps while explaining to the person that 500 millilitres is just a little more than a pint.

B. DIRECTIONS - Exercise 6.

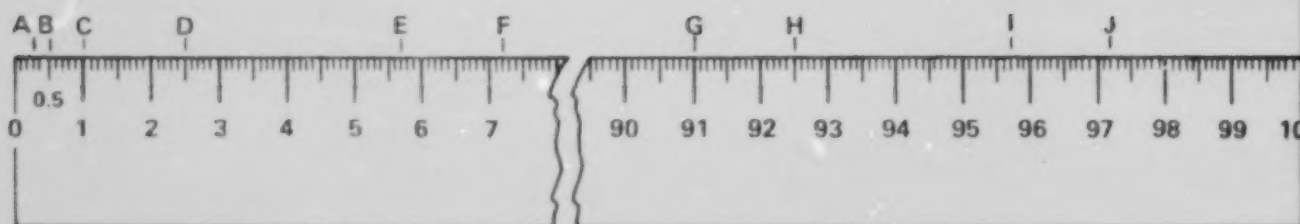
You will need Information Sheet No. 4, Table 3, and Exercise No. 6, "Any Way You Want It." We suggest you work quickly through the examples in Item 1, try two examples from Item 2, and one or two examples from Item 3.

We have allocated 15 minutes for this activity in the Workshop; 30 - 45 minutes may be needed in the classroom.

C. ACTIVITY, Metric-Customary Equivalents

D. FOLLOW-UP

Large group follow-up.



There are 100 centimetres in one metre. (100)
There are 10 millimetres in one centimetre
or 1000 millimetres in one metre. (1000 mm)

The symbol for metre is "m"
The symbol for centimetre is "cm"
The symbol for millimetre is "mm"

A is read as 0.3 cm or 3 mm.
C is read as 1 cm or 10 mm.
D is read as 2.5 cm or 25 mm.
E is read as 5.7 cm or 57 mm.
F is read as 7.2 cm or 72 mm.

B is read as _____ cm or _____ mm.
G is read as _____ cm or _____ mm.
H is read as _____ cm or _____ mm.
I is read as _____ cm or _____ mm.
J is read as _____ cm or _____ mm.

MEASUREMENT ACTIVITIES LINEAR RESOURCE TABLE

MEASURES OF LENGTH METRE, CENTIMETRE, MILLIMETRE

1. The metre (m)

A. DEVELOP A FEELING FOR HOW LONG A METRE IS

1. Take a metre stick and stand it up on its end on the floor with your hand on top.
2. Keeping your hand on top,
 - a. walk around the metre stick
 - b. stand very close to it and with your other hand touch the part of the body at the top of the stick

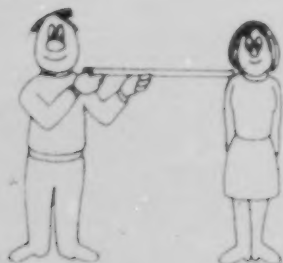
THAT IS HOW HIGH A METRE IS!

3. Put one end of the metre stick in your right hand. Stretch that arm straight out to the side. Keep the end of the metre stick even with the end of the longest finger of that hand. With your left hand, press against your body at the other end of the metre stick.

THAT IS HOW LONG A METRE IS!

4. Choose a partner to stand out to your side. Move apart so you can place one end of the metre stick against their upper arm. Look at the space between you. "Feel" how far apart you are.

THAT IS THE DISTANCE OF ONE METRE!



B. DEVELOP YOUR ABILITY TO GUESSTIMATE

You are now ready to develop your ability to estimate--to make a reasonable guess.

1. Remember where the length of a metre was on your body.
2. For each of the items below;

First, guesstimate the size and write your answer in the Estimate column. Second, measure with your metre stick and write the answer in the Measurement column.

Third, decide how close you were. If your estimate is within 25% of the measurement, you are a "METRIC MARVEL."

3. If you have time, find some other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Height of door knob from floor	_____	_____	_____
2. Height of door	_____	_____	_____
3. Length of table	_____	_____	_____
4. Width of table	_____	_____	_____
5. Length of wall of this room	_____	_____	_____
6. Distance from you to a wall	_____	_____	_____
7. Other _____	_____	_____	_____
8. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH METRES

If you want extra practice try these:

1. Length of a chalkboard	_____	_____	_____
2. Width of a hall	_____	_____	_____
3. Distance from a chair to a wall	_____	_____	_____

II. The centimetre (cm)

A. DEVELOP A FEEL" FOR THE SIZE OF A CENTIMETRE

1. Hold the centimetre ruler against the width of your fingernail. How wide is it? _____ cm
2. Hold the ruler against your thumb from the first joint to the end of your thumb. How long is it? _____ cm

3. Hold the ruler against the width of your palm. How wide is it? _____ cm
4. Hold the ruler against your index or pointing finger. How long is it?
_____ cm
5. Circle the wrist of one hand with the thumb and index finger of the other. Then measure your wrist with a tape measure. What is the circumference or distance around? _____ cm
6. Find your waist size with a tape measure. _____ cm

B. DEVELOP YOUR ABILITY TO GUESSTIMATE

You are now ready to "guesstimate" in centimetres.

1. Remember the size of a centimetre.
2. For each of the items below;

First, guesstimate the size and write your answer in the Estimate column. Second, measure with your metre stick and write the answer in the Measurement column.

Third, decide how close you were. If your estimate is within 25% of the measurement, you are a "METRIC MARVEL."

3. If you have time, find some other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Length of a paper clip	_____	_____	_____
2. Diameter (width) of a coin	_____	_____	_____
3. Width of a postage stamp	_____	_____	_____
4. Length of a pencil	_____	_____	_____
5. Width of a sheet of paper	_____	_____	_____
6. Space between two cities on a map	_____	_____	_____
7. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH CENTIMETRES

1. Length of an envelope	_____	_____	_____
2. Width of an envelope	_____	_____	_____
3. Height of a chair seat	_____	_____	_____
4. Thickness of a book	_____	_____	_____
5. Length of a sheet of paper	_____	_____	_____

11. The millimetre (mm)

There are 10 millimetres in 1 centimetre. When a measurement is 2 centimetres and 4 millimetres, you write 24 mm. There are 1000 millimetres in 1 metre.

A. DEVELOP "A FEEL" FOR THE SIZE OF A MILLIMETRE

Using a ruler marked in millimetres, measure:

1. the thickness of a paper clip wire. _____ mm
2. the thickness of your fingernail. _____ mm
3. the width of your fingernail. _____ mm
4. the diameter (width) of a coin. _____ mm
5. the diameter (thickness) of your pencil. _____ mm
6. the width of your palm. _____ mm

B. DEVELOP YOUR ABILITY TO ESTIMATE IN MILLIMETRES

You are now ready to "guesstimate" in millimetres.

1. Remember the size of a millimetre.
2. For each of the items below;

First, guesstimate the size and write your answer in the Estimate column. Second, measure with your ruler and write the answer in the Measurement column.

Third, decide how close you were. If your estimate is within 25% of the measurement, you are a "METRIC MARVEL."

3. If you have time, find some other things to measure.

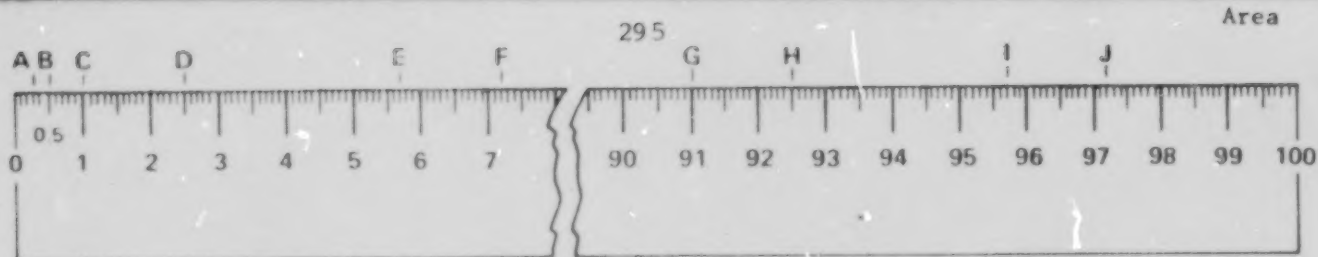
	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Thickness of a nickel	_____	_____	_____
2. Diameter (thickness) of a bolt	_____	_____	_____
3. Length of a bolt	_____	_____	_____
4. Width of a sheet of paper	_____	_____	_____
5. Thickness of a board or desk top	_____	_____	_____
6. Thickness of a button	_____	_____	_____

C. EXTRA PRACTICE WITH MILLIMETRES

1. Length of an envelope _____
2. Width of an envelope _____

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
3. Width of a postage stamp	_____	_____	_____
4. Length of a pencil	_____	_____	_____
5. Thickness of a table leg	_____	_____	_____

NOW YOU ARE READY FOR THE "LINEAR" MEASUREMENTS IN EXERCISE NO. 1. CHOOSE THE UNIT OF LENGTH TO USE FOR EACH MEASUREMENT. THEN ESTIMATE AND FIND THE ACTUAL MEASUREMENT.



There are 100 centimetres in one metre. (100 cm)
 There are 10 millimetres in one centimetre (10 mm)
 or 1000 millimetres in one metre. (1000 mm)

The symbol for metre is "m"
 The symbol for centimetre is "cm"
 The symbol for millimetre is "mm"

A is read as 0.3 cm or 3 mm.
 C is read as 1 cm or 10 mm.
 D is read as 2.5 cm or 25 mm.
 E is read as 5.7 cm or 57 mm.
 F is read as 7.2 cm or 72 mm.

B is read as _____ cm or _____ mm.
 G is read as _____ cm or _____ mm.
 H is read as _____ cm or _____ mm.
 I is read as _____ cm or _____ mm.
 J is read as _____ cm or _____ mm.

AREA RESOURCE TABLE

SQUARE CENTIMETRE, SQUARE METRE

WHEN YOU DESCRIBE THE AREA OF SOMETHING YOU ARE SAYING HOW MANY SQUARES OF A GIVEN SIZE IT WOULD TAKE TO COVER THE SURFACE.

I. The square centimetre (cm²)

A. DEVELOP A FEELING FOR THE SQUARE CENTIMETRE

1. Take a clear plastic grid or use the grid on page 4. (If you use the grid on page 4, place the thing to be measured over the grid and lightly draw its outline with a pencil. Then remove it and count the squares.)
2. Measure the length and width of one small square with a centimetre ruler.

THAT IS ONE SQUARE CENTIMETRE!

3. Place the grid over a fingernail.
 About how many squares does it take to cover your fingernail? _____ cm²
4. Place the grid over a coin.
 About how many squares does it take to cover the coin? _____ cm²
5. Place the grid over a postage stamp.
 About how many squares does it take to cover the postage stamp? _____ cm²
6. Place the grid over an envelope. (You may have to mark the envelope and move the grid to cover all the envelope.)
 About how many squares does it take to cover the envelope? _____ cm²
7. Measure the length and width of the envelope with a centimetre ruler.
 Length _____ cm, width _____ cm. Multiply to find the area in square centimetres. _____ cm x _____ cm = _____ cm². How close were the answers you got by counting squares, and then by measuring and multiplying? _____

B. DEVELOP YOUR ABILITY TO GUESSTIMATE IN SQUARE CENTIMETRES

Your are now ready to develop your ability to guesstimate--to make a reasonable guess.

1. Remember the size of a square centimetre.
2. For each of the items below;

First, guesstimate the size and write your answer in the Estimate column.

Second, measure the item either by counting squares on the grid or by measuring and multiplying. Write your answer in the Measurement column.

Third, decide how close you were. If your Estimate is within 25% of the measurement, you are a "METRIC MARVEL."

3. If you have time, find some other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Index card	_____	_____	_____
2. Book cover	_____	_____	_____
3. Photograph	_____	_____	_____
4. Window pane or desk top	_____	_____	_____
5. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH SQUARE CENTIMETRES

1. Watch	_____	_____	_____
2. Notebook cover	_____	_____	_____
3. Napkin or tissue	_____	_____	_____
4. Small piece of cloth, plastic or leather	_____	_____	_____

WOULD YOU WANT TO FIND THE AREA OF A FLOOR, WALL, ROOF, LAWN OR LARGE PIECE OF MATERIAL BY COUNTING CENTIMETRE SQUARES?

Discuss with your neighbor.

II. The square metre (m^2)

A. DEVELOP A FEELING FOR THE SQUARE METRE

1. Using metre sticks, paper or cardboard, tape them together to make a square which is one metre long and one metre wide. Or, use a square which has been made.

2. Hold the square up with one edge on the floor to see how big it is next to you.
3. Place the square over a table top or desk to see how much it covers.
4. Place the square against the bottom or top of a door. See how much it covers. How many does it take to cover the door? _____ m^2
5. Place the square on the floor in a corner or next to a wall. Step back and look.
See how much it covers.

THAT IS HOW BIG A SQUARE METRE IS!

B. DEVELOP YOUR ABILITY TO GUESSTIMATE WITH SQUARE METRES

You are now ready to guesstimate in square metres.

1. Remember the size of a square metre.
2. For each of the items below;

First, guesstimate the size and write your answer in the Estimate column.

Second, measure the item. Write your answer in the Measurement column.

Third, decide how close you were. If your Estimate is within 25% of the Measurement, you are a "METRIC MARVEL."

3. If you have time, find some other things to measure.

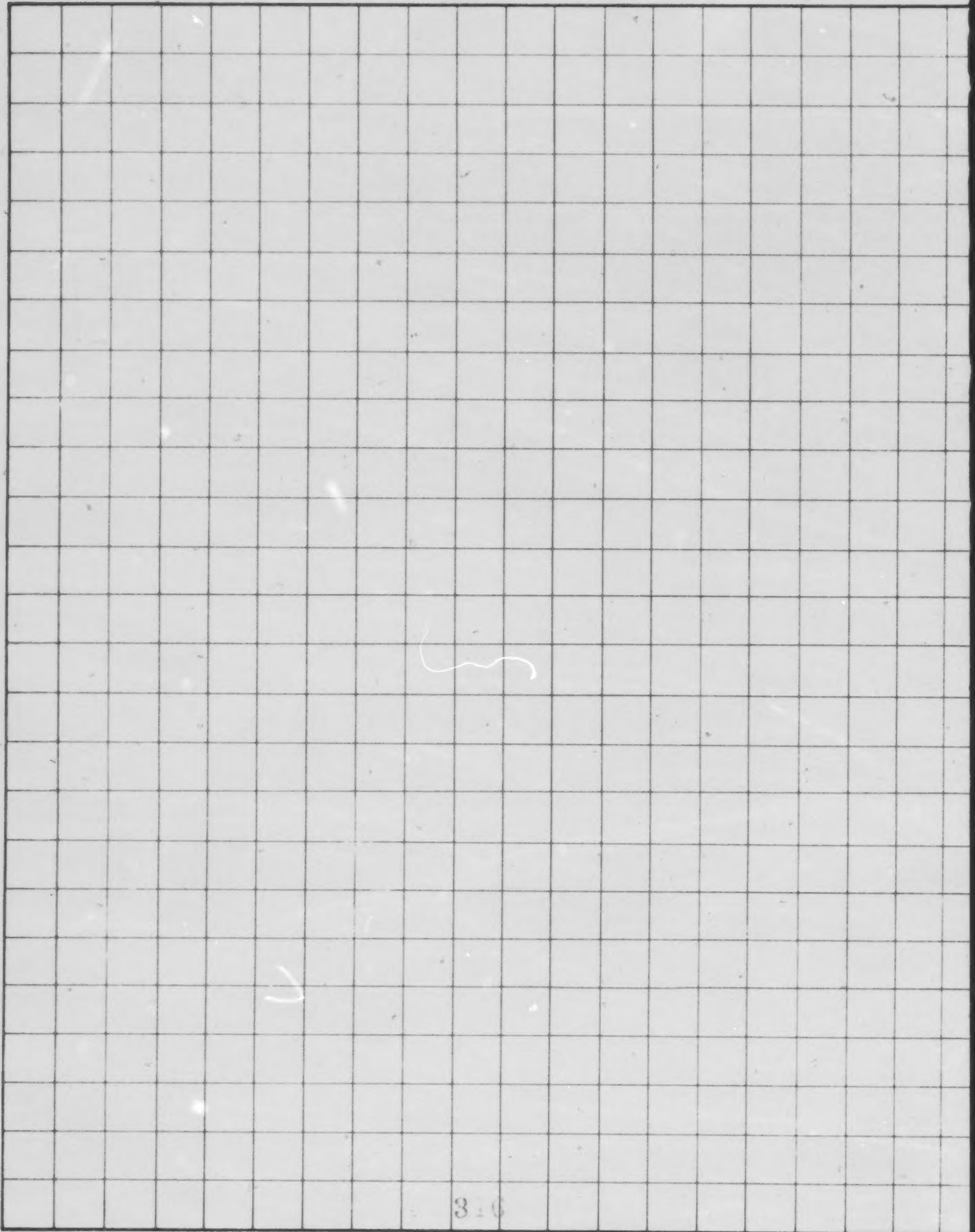
	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Door	_____	_____	_____
2. Full sheet of newspaper	_____	_____	_____
3. Chalkboard or bulletin board	_____	_____	_____
4. Floor	_____	_____	_____
5. Other _____	_____	_____	_____

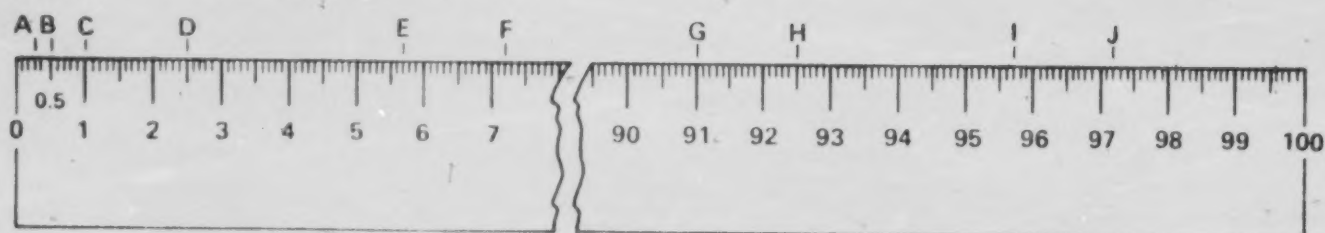
How many square centimetres are in one square metre? _____

C. EXTRA PRACTICE WITH SQUARE METRES

1. Desk top	_____	_____	_____
2. Side of file cabinet	_____	_____	_____
3. Wall chart or poster	_____	_____	_____
4. Large piece of cloth, paper, plastic, or plywood	_____	_____	_____

YOU ARE NOW READY FOR THE "AREA" MEASUREMENT IN EXERCISE NO. 1. DECIDE WHICH METRIC AREA UNIT TO USE FOR EACH MEASUREMENT. THEN ESTIMATE AND FIND THE ACTUAL MEASUREMENT.

Centimetre Grid



There are 100 centimetres in one metre. (100 cm)
 There are 10 millimetres in one centimetre (10 or 1000 millimetres in one metre. (1000 mm)

The symbol for metre is "m"

The symbol for centimetre is "cm"

The symbol for millimetre is "mm"

A is read as 0.5 cm or 5 mm.

C is read as 1 cm or 10 mm.

D is read as 2.5 cm or 25 mm.

E is read as 5.7 cm or 57 mm.

F is read as 7.2 cm or 72 mm.

B is read as _____ cm or _____ mm.

G is read as _____ cm or _____ mm.

H is read as _____ cm or _____ mm.

I is read as _____ cm or _____ mm.

J is read as _____ cm or _____ mm.

VOLUME RESOURCE TABLE

CUBIC CENTIMETRE, LITRE, MILLILITRE, CUBIC METRE

1. The cubic centimetre (cm³)

A. DEVELOP A FEELING FOR THE CUBIC CENTIMETRE

1. Pick up a colored plastic cube. Measure its length, height, and width in centimetres.

THAT IS ONE CUBIC CENTIMETRE!

2. Find the volume of the litre box.

- a. Measure the length and width of one of the squares on the litre box in centimetres. Length _____ cm, width _____ cm.
- b. Measure the length, width and depth of the litre box in centimetres, and count the squares. Length _____ cm, number of squares _____; Width _____ cm, number of squares _____; Depth _____ cm, number of squares _____.
- c. Place a ROW of cubes against the bottom row of the front of the litre box. How many CUBES fit in the row? _____
- d. Place the ROW of cubes against the squares on the side of the box. How many ROWS would fit in the bottom layer of the box? _____
How many CUBES in each row? _____
How many CUBES would fit in the box altogether? _____
- e. Stand the ROW of cubes up against the side of the box. How many LAYERS would fit in the box? _____
How many CUBES in each layer? _____
How many CUBES would fit in the box altogether? _____

THE LITRE BOX WILL HOLD _____ CUBIC CENTIMETRES:

B. DEVELOP YOUR ABILITY TO GUESSTIMATE WITH CUBIC CENTIMETRES

You are now ready to develop your ability to estimate--to make a reasonable guess.

1. For each item below;

First, Estimate and write down how many cubic centimetres would fit in the space used by the object, or the space inside the object. Second, measure and multiply to find the Measurement. Third, decide how close you were. If your Estimate is within 25% of the Measurement, you are a "METRIC MARVEL!"

2. If you have time, find some other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Index card file box	_____	_____	_____
2. Freezer container	_____	_____	_____
3. Paper clip box	_____	_____	_____
4. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH CUBIC CENTIMETRES

1. Box of staples	_____	_____	_____
2. Book	_____	_____	_____
3. Package of paper	_____	_____	_____
4. Cardboard box	_____	_____	_____

II. The litre (l)

A. DEVELOP A FEELING FOR THE LITRE

1. Take a one litre beaker and fill it with water.
2. Pour the water into paper cups or drinking glasses, filling each as full as you usually do.
How many cups or glasses did you fill? _____

THAT IS HOW MUCH IS IN ONE LITRE!

3. Fill the litre box with rice.

THAT IS HOW MUCH IT TAKES TO FILL A ONE LITRE CONTAINER!

4. Take a litre beaker and fill it with 1 litre of water.
5. Pour the water into a large jug, bottle or freezer container.

THAT IS HOW MUCH SPACE ONE LITRE WILL FILL!

B. DEVELOP YOUR ABILITY TO GUESSTIMATE WITH LITRES

You are now ready to develop your ability to estimate--to make a reasonable guess.

To write two and one-half litres, you write 2.5 l

To write one-half litre, you write 0.5 l

To write two and three-fourth litres, you write 2.75 l

There are 1000 millilitres in 1 litre.

Half a litre is 500 millilitres (ml)

1. For each item below;

First, Estimate and write down how many litres you think it is.
Second, fill the container to the level you usually would. Measure how much it holds with a litre measure. Write the Measurement.
Third, decide how close you were.

2. If you have time, find some other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Medium-size freezer container	_____	_____	_____
2. Large freezer container	_____	_____	_____
3. Small freezer container	_____	_____	_____
4. Bottle or jug	_____	_____	_____
5. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH LITRES

1. Milk carton	_____	_____	_____
2. Soda bottle or can	_____	_____	_____
3. Mixing or serving bowl	_____	_____	_____
4. Sauce pan	_____	_____	_____

III. The millilitre (ml)

A. DEVELOP A FEELING FOR THE MILLILITRE

1. Examine a centimetre cube. A container which will hold 1 cubic centimetre will hold 1 millilitre.
2. Fill a 1 millilitre measuring spoon with rice.
Empty it into your hand.
Carefully pour it into a small pile on a sheet of paper.

THAT IS HOW MUCH 1 MILLILITRE IS!

3. Fill the 5 millilitre spoon with rice.
Pour it into another pile on the sheet of paper.

THAT IS 5 MILLILITRES OR ONE TEASPOON!

4. Fill the 15 millilitre spoon with rice.
Pour it into another pile on the sheet of paper.

THAT IS 15 MILLILITRES OR ONE TABLESPOON!

THESE TWO MEASURES STAY THE SAME SIZE.

5. Fill the 100 millilitre beaker with 100 ml of water.

THAT IS HOW MUCH 100 MILLILITRES IS!

- B. DEVELOP YOUR ABILITY TO GUESSTIMATE WITH MILLILITRES
You are now ready to estimate with millilitres.

1. For each of the items below;

First, Estimate and write down how many millilitres you think it will hold.

Second, fill it and measure it with a millilitre measure. Write the Measurement.

Third, decide how close you were.

2. If you have time, find other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Small juice can	_____	_____	_____
2. Paper cup or tea cup	_____	_____	_____
3. Soft drink can	_____	_____	_____
4. Bottle	_____	_____	_____
5. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH MILLILITRES

1. Small handful of rice	_____	_____	_____
2. Milk carton	_____	_____	_____
3. Bottle cap.	_____	_____	_____
4. Jar	_____	_____	_____

IV. The cubic metre (m^3)

A. DEVELOP A FEELING FOR THE CUBIC METRE

A cubic metre is one metre long, one metre wide, and one metre high.

1. Place a 1 metre square on the floor next to a wall.
2. Measure 1 metre up the wall.
3. Picture a box that would fit into the space.

THAT IS THE VOLUME OF 1 CUBIC METRE.

4. Place a metre stick next to the table.
Remember how far the end was above the table.
Place a metre stick across the width of the table.
Remember how far the end was past the table.
Measure the table length in metres.
Picture how many cubic metres would fit into the space used by the table. _____ m^3

B. DEVELOP YOUR ABILITY TO GUESSTIMATE

1. For each of the items below;

First, Estimate and write down how many cubic metres you think it is.
Second, measure and multiply the length times width times height.
Write down the Measurement.
Third, decide how close you were.

2. If you have time, find other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Office desk	_____	_____	_____
2. File cabinet	_____	_____	_____
3. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH CUBIC METRES

1. Locker	_____	_____	_____
2. Closet or storage space	_____	_____	_____
3. Small room	_____	_____	_____
4. Large laboratory or shop equipment	_____	_____	_____

NOW YOU ARE READY FOR THE "VOLUME" MEASUREMENT IN EXERCISE NO. 1. CHOOSE THE UNIT OF VOLUME TO USE FOR EACH MEASUREMENT. THEN ESTIMATE AND FIND THE ACTUAL MEASUREMENT.

MASS RESOURCE TABLE

KILOGRAM, GRAM

Kilo = 1000

The symbol for gram is g

The symbol for kilogram is kg

There are 1000 grams in one kilogram.

1000 g = 1 kg

Half a kilogram can be written as 500 g or 0.5 kg

A quarter of a kilogram can be written as 250 g or 0.25 kg

Two and three-quarter kilograms is written as 2.75 kg

I. The kilogram (kg)

A. DEVELOP A FEELING FOR THE MASS OF A KILOGRAM

Using the balance or scale, find the mass (weight) of the items on the table. Notice how heavy the object "feels" and compare it to the reading on the scale or balance.

	<u>Mass (weight)</u>
1. 1 kilogram box	_____
2. Text book	_____
3. Bag of sugar	_____
4. Package of paper	_____
5. Your own mass	_____
6. Other _____	_____

B. DEVELOP YOUR ABILITY TO GUESSTIMATE IN KILOGRAMS

1. Remember the mass of a kilogram.

2. For the following items;

First, estimate the mass (weight) of the object and write down your answer in the Estimate column.

Second, use the scale or balance and find the mass of the object. Third, decide how close your estimate is. If you are within 25% of the measurement, you are a "METRIC MARVEL."

3. If you have time, find some other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Bag of rice	_____	_____	_____
2. Bag of nails	_____	_____	_____
3. Large purse or briefcase	_____	_____	_____
4. A neighbor	_____	_____	_____
5. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH KILOGRAMS

1. A few books	_____	_____	_____
2. Chair	_____	_____	_____
3. Box of supplies	_____	_____	_____

II. The gram (g)

A. DEVELOP A FEELING FOR THE GRAM

1. Take a colored plastic cube, hold it in your palm.
 - a. Shake the cube in your hand as if shaking dice
 - b. feel the pressure on your hand when the cube is in motion, then when it is at rest.

THAT IS HOW HEAVY A GRAM IS!

2. Take a second cube and attach it to the first.
 - a. Shake the cubes in each hand
 - b. rest the cubes on the tips of your fingers, moving your hand up and down.
3. Take a third cube and place it on your hand.
 - a. Shake them around in your hand comparing the mass of one gram with the mass of two grams.

THAT IS THE DIFFERENCE BETWEEN ONE AND TWO GRAMS!

4. Take 5 more cubes and attach them together.
 - a. Place them in your hand and shake them around
 - b. rest them on the tips of your outstretched fingers.

THAT IS THE MASS OF FIVE GRAMS!

B. DEVELOP YOUR ABILITY TO GUESSTIMATE IN GRAMS

You are now ready to develop your ability to estimate--to make a reasonable guess.

1. Remember how heavy the 1 gram cube is, how heavy the two gram cubes are, and how heavy the five gram group is; or compare them again to the mass of the thing you are measuring.

2. For each of the following items;

First, write down your Estimate.

Second, find its mass on a scale.

Third, decide how close your estimate is. If you are within 25% of the measurement, you are a "METRIC MARVEL."

3. If you have time, find some other things to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Two thumb tacks	_____	_____	_____
2. Pencil	_____	_____	_____
3. Two-page letter and envelope	_____	_____	_____
4. Nickel	_____	_____	_____
5. Apple	_____	_____	_____
6. Package of margarine	_____	_____	_____
7. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH GRAMS

1. Key	_____	_____	_____
2. Watch	_____	_____	_____
3. Ring	_____	_____	_____
4. Ruler or metre stick	_____	_____	_____

NOW YOU ARE READY FOR THE "MASS" MEASUREMENT IN EXERCISE NO. 1. CHOOSE THE UNIT OF MASS TO USE FOR EACH MEASUREMENT. THEN ESTIMATE AND FIND THE ACTUAL MEASUREMENT.

TEMPERATURE RESOURCE TABLE

DEGREE CELSIUS

Degree Celsius ($^{\circ}\text{C}$) is the metric measure for temperature for everyday use.

A. DEVELOP A FEELING FOR DEGREE CELSIUS

Take an indoor/outdoor Celsius thermometer. Look at the marks on it.

1. Find 0 degrees.

WATER FREEZES AT ZERO DEGREES CELSIUS (0°C).

2. Find 100 degrees.

WATER BOILS AT 100 DEGREES CELSIUS (100°C).

3. Find the temperature of the room. _____ $^{\circ}\text{C}$

Is the room cool, warm or about right? _____

A comfortable temperature outside might be about _____ $^{\circ}\text{C}$.

4. Put some hot water from the faucet into a container with the thermometer.

Find the temperature. _____ $^{\circ}\text{C}$

Dip your finger quickly in and out of the water. Is the water very hot, hot or just warm? _____

5. Put some cold water in a container with the thermometer.

Find the temperature. _____ $^{\circ}\text{C}$

Dip your finger into the water.

Is it cool, cold or very cold? _____

6. Bend your arm at the inside of your elbow around the bottom of the thermometer or a clinical thermometer; or hold your hand against the bottom of the glass. After about three minutes, find the temperature. _____ $^{\circ}\text{C}$

Your skin temperature will not be as high as your body temperature.

NORMAL BODY TEMPERATURE IS 37 DEGREES CELSIUS. (37°C)

A FEVER IS 39°C .

A VERY HIGH FEVER IS 40°C .

B. DEVELOP YOUR ABILITY TO GUESSTIMATE IN DEGREE CELSIUS

You are now ready to develop your ability to guesstimate-- to make a reasonable guess.

For each item, Estimate and write down how many degrees Celsius you think it is. Then measure and write the Measurement. Then decide how close you were.

If your Estimate is within 25% of the Measurement, you are a "METRIC MARVEL!"

If you have time, find some other temperatures to measure.

	<u>ESTIMATE</u>	<u>MEASUREMENT</u>	<u>HOW CLOSE WERE YOU?</u>
1. Mix some hot and cold water in a container. Dip your finger into the water.	_____	_____	_____
2. Pour out some of the water. Add some hot water. Dip your finger <u>quickly</u> into the water.	_____	_____	_____
3. Outdoor temperature.	_____	_____	_____
4. Other _____	_____	_____	_____

C. EXTRA PRACTICE WITH DEGREE CELSIUS

1. Sunny window	_____	_____	_____
2. Temperature at floor	_____	_____	_____
3. Temperature near ceiling	_____	_____	_____
4. Temperature near a light	_____	_____	_____
5. Mix of ice and water	_____	_____	_____
6. Boiling water	_____	_____	_____
7. Refrigerator or freezer	_____	_____	_____
8. Outdoor temperature at ground level	_____	_____	_____

SUGGESTED METRIC TOOLS AND DEVICES
NEEDED TO COMPLETE MEASUREMENT TASKS
(Objective 1)

There is no single list of measuring devices that must be acquired by a school for the teaching of common units in the metric system. The following list is given for your consideration only. The items listed were selected from reliable suppliers and are readily available.

The following items will provide a teacher with the devices needed for completing the activities and exercises of objective one. Items marked with an asterisk (*) are optional and may be substituted by using another device. For example, a measuring tape attached to a wall can be used in place of a height measure.

Quantities are suggested for a class of twenty to twenty-five students. Here are some additional tips that may be helpful:

- Plan well in advance and consider all aspects of the use of the equipment.
- Look for metric equipment that is already in the school. Check with the math and science departments.
- Consider letting students design and construct some of the items. Also the advisability of converting old equipment for interim use.
- Stretch your budget. Prices differ among companies. Sometimes a local store is your best source. Multi-purpose items of good quality are worth considering.
- Improvise, where feasible, to save money, and often to improve the learning experience.

Activity	Quantity	Measurement Device	Supplier	Catalog No.	Price
Linear	10 - 12	Metre Stick	Black	88006	2.90 ea.
			Brodhead	191009	2.89 ea.
	10 - 12	Rule, 30 cm	Ohaus	80010	2.95 ea.
			Black	88029	4.90 pkd. of 10
	10 - 12	Measuring Tape, 150 cm	Ohaus	80080	.45 ea.
			Black	88225	3.40 pkd. of 10
			Ohaus	80110	5.00 pkd. of 10
	1	*Height Measure	Black	*88039	15.80 ea.
		*Floor Stand for 88039	Black	88040	8.60 ea.
	1	*Metre Tape, 10 metre	Black	88013	6.90 ea.
Optional	1	Trundle Wheel	Ohaus	80130	9.95 ea.
			Black	88047	9.30 ea.
			Ohaus	80190	10.95 ea.
	1	*Area Measuring Grid			
		Transparent 25 cm x 25 cm	Black	88168	1.25 ea.
		Graph Paper, cm squares			



AGRI-BUSINESS AND NATURAL RESOURCES

Ag. Sup. & Services	A D F G I J K N O
Ag. Production	A B E F I K N O
Ag. Mechanics	A B C D E I K N
Horticulture	A B E F I J K N O
Forestry	A I J K N O

BUSINESS & OFFICE

Typists	*
Clerk-Typists	*
Gen. Office Clerks	*
Stenography	*
Key Punch Opers.	*

ARTS & HUMANITIES

Brdcast. Announcing	*
Theat. Costuming	N
Stg. Ltg. Tech.	*
Tech. Theat. Asst.	A B
Asst. Theat. Mgr.	A

COMMUNICATION MEDIA

Type Composition	H N
Layout & Design	N
Copy Preparation	N
Off. Prt. Prs. Opr.	D K N
Litho-Photography	H N
Offset Stripping	J K N
Offset Pltmaking	J K N
Bindery Operation	C
Comm. Photography	H N
Arch. Drafting	N O
Civil Drafting	F G K N O
Mech. Drafting	A C D

CONSTRUCTION

Air Cond. & Refrig.	A H J K L N
Heating	A G L
Ventilating	A L
Plumbing	A F I K
Pipefitting	A K
Res. Electricity	A B D I
Indus. Electricity	A B D I
Comm. Electricity	A B D I

HOME ECONOMICS

Child Care Aides	H N
Tailoring	*
Alter. Spec.	*
Homemkr & Health	G H
Food Preparation	H N O
Int. Des. Asst.	*
Bakers	H N O
Meat Cutting	N

ENVIRONMENTAL CONTROL

Wastewater Tech. *

HEALTH OCCUPATIONS

Nurses Aides	G K N
Nursing (RN)	G K N
LPN	G K N
Dental Assts.	G N
Diet. Techns.	*

HOSPITALITY & REC.

Rec. & Tourism	F M N
Hotel & Lodging	M N
Food Services	N

MANUFACTURING

Sht. Metal Wkng.	A B C D K
Welding & Cutting	A B C D K N
Tool & Die Mknq.	A B C D I
NC Operation	A C D E I
Metal Patternmknq.	A B I
Blueprint Rdq.	C D
Indus. Electronics	A B C D H I
Sm. Appl. Repair	A B D I
Maj. Appl. Repair	A B D H I O
Radio-TV Repair	A B D I
Audio Equip. Repair	A B D I

MRKTING & DISTRIB.

Hd. Goods Merch.	*
Food Dist.	F N
Auto. Merch.	A B D E F I K N O
PetroL. Marketing	A B E F I K M N
Transportation	A F
Sft. Goods Merch.	*

PERSONAL SERVICES

Cosmetology	N
-------------	---

TRANSPORTATION

Sm. Engine Repair	A B D E I K O
Diesel Mechanics	A B D G I K N
Auto Mechanics	A B D E I K N
Aviation Electronics	A B D I

PUBLIC SERVICE

Fire Service	F G
Law Enforcement	F

* No additional devices are required.

SUGGESTED METRIC TOOLS AND DEVICES
NEEDED TO COMPLETE MEASUREMENT TASKS
(Objectives 2 - 4)

Code
(See back side)

- A Assorted Metric Hardware. Hexagon Head cap screws, Hex nuts, washers, screws, cotter pins, etc.
- B Drill Bits. Individual bits or sets within the range of 1 mm to 13 mm.
- C Vernier Caliper. Pocket slide type with range to 120 mm.
- D Micrometer. Outside micrometer caliper with range of 0 to 25 mm.
- E Feeler Gage. Thickness gage with 13 blades and range of .05 to 1 mm.
- F Metre Tape. 50 or 100-metre tape for measuring long linear distances.
- G Thermometers. Special Purpose types used by students in certain occupational programs, such as a clinical thermometer used in the Health Occupations.
- H *Temperature Devices. Indicators used in a special application; ovens, freezing, cooling systems, etc.
- I Tools. Metric open end or Box wrench sets, socket sets, hex key sets.
- J Certain weather measuring devices. Rain gage, barometer, humidity, wind velocity indicators. (See package for specific needs)
- K *Pressure. Measuring devices for tire pressure, air, oxygen, hydraulic, fuel, etc.
- L *Velocity. Direct reading meter or vane type meter.
- M Road Map. State and city road maps.
- N Containers. Large non-metric containers for mixing and storing liquids; buckets, plastic containers, etc.
- O Containers. Large non-metric containers for mixing and storing dry ingredients; boxes, buckets, cans, etc.

Measuring devices currently are not available. Substitute devices (i.e. thermometer) may be used to complete the measurement task.

Most of the above items may be obtained from local industrial, hardware and school suppliers. For those who desire a listing of national suppliers, please contact a staff member of the Metric Education Project.

SUGGESTED LESSON PLANS

Lesson 1, METRIC UNITS AND THEIR USES

OBJECTIVES

The student will recognize and use metric units, terms, and symbols.

Given a metric unit, state a physical referent.

Given a measurement task, select the appropriate metric unit.

Given a measurement, write in metric symbols using proper rules of notation.

RESOURCES

Metric measuring devices (metre sticks, rules, tapes, scales, thermometers, measuring containers)
Objects to be measured (see attached)
Resource Table Worksheets (Linear, Area, Volume, Mass, Temperature)
Information Sheet No. 1
Exercise Sheet No. 1
Table 1
Visual No. 2
*Overhead projector
*Film, Measuring with Meters
*16 mm Projector
*Glue or rubber cement
*Decimetre, centimetre, millimetre strips (10 of each for each student)
*Racking strip for metre stick or tape, heavy paper, posterboard, wood (1 for each student)

OBJECTIVES

(Same as objectives above)

RESOURCES

Table 2
Exercise Sheet 2

* Optional.

PROCEDURE

ACTIVITY A "TRYING OUT METRIC UNITS" (two 45 to 50 minute periods)

1. Assemble metric measuring devices and objects to be measured at learning stations.
Set-up separate stations for linear, Area, Volume, Mass, and Temperature.
- *2. Have students construct metre sticks or tapes using decimetre, centimetre, and millimetre strips.
3. Direct or have students proceed through introductory exercises with Linear Measures, Area, Volume, Capacity, Mass and Temperature, and the related section of Exercise No. 1 at learning stations.
Provide strong positive reinforcement during the activity--estimating within 25% is "excellent" for this activity. Tell students, if they are within 25% they are a "METRIC MARVEL."
4. In group follow-up use Table 1 and Information Sheet 1 to discuss:
 - a. the base units and their symbols,
 - b. the use of prefixes, and,
 - c. the Rules of Notation.
5. In follow-up, have students describe useful references they have found for metric units and values (Table 1 can be used in the discussion).
6. Use Visual No. 2 to discuss:
 - a. some common temperatures, and
 - b. the range of temperatures found by different students measuring the same situation.Remind them to practice using metric estimates in daily life and work tasks, to maintain and improve skills.
7. The film, Measuring with Meters (22 minutes) is excellent for supplementing these activities and concepts.
Remind them that measurements are not exact but variations should be reasonable or explainable.
Note that either the -er or -re spelling (meter or metre) is correct.

ACTIVITY B "WHAT METRIC UNIT WILL YOU USE?" (30-45 minutes)

1. Make available Table 2 and Exercise Sheet 2.
Call attention to the following:
2. Through large group discussion or small group study and discussion, have students identify which metric measurements to use for the tasks in Exercise 2.
 - a. Table 2 provides only selected examples of uses in the occupation,
 - b. more or fewer metric units may be needed on the job,
 - c. industry may decide to use a different metric unit as a standard practice.
3. Provide follow-up checking, and discussion as needed.
However, these experiences will prepare the students for changes or additions. More than one answer may be correct for a measurement task in Exercise 2; e.g., the mass of 3 apples could be measured in grams or kilograms.

Metric Education Project

MATERIALS FOR LEARNING STATIONS

(Lesson 1)

<u>Linear</u>		<u>Mass</u>		<u>Volume</u>	
4-6	Metre sticks	1	Gram balance scale	2-4	Metre sticks
4-6	Centimetre/millimetre rules	1	Gram/kilogram scale	5-10	Centimetre cubes
2-4	150 cm cloth tapes	* 1	Personal scale	1-3	Litre boxes, plastic or cardboard
10	Paper clips, giant size	1-2	Textbooks (approx. 1 kg each)	1	Index card file box
2	Postage stamps on envelopes	1	Bag of sugar 2 lb. or 5 lb.)	3-6	Freezer containers, plastic, 1-2 each of 3 different sizes
1	State map, two cities circled	1	Package of paper	1	Paper clip box
3	Bolts (any size)	1-2	Packages of margarine (1 lb.)	1-2	Millilitre/litre beakers, plastic or glass
2-4	Buttons, large or medium	1	Bag of rice (approx. 1 kg)	*1-2	Measuring cups; 250 or 500 ml
		*20-30	Plastic gram cubes	1-2	Bottle, quart or larger
		1	Bag of nails (approx. 1 kg)	1-2	Jugs, 1 1/2 qt. - 1 gal.
		20-30	Paper clips, giant size	* 1	Funnel
*2-4	Plastic grids	10	Thumb tacks	1	Bag of rice (approx. 2-5 lbs.)
2-4	Metre sticks	1	Two page letter in envelope	1-2	Small juice cans (8 oz. size)
2-4	Centimetre/millimetre rules	1-3	Apples	1-2	Juice cans (12 oz. size)
6	Index cards (small or medium size)	1	Litre beaker	1-2	Soft drink cans (standard size)
2	Postage stamps on envelopes			6	Paper cups or drinking glasses
2	Photographs, medium-sized newspaper or magazine	2-4	Thermometers, Celsius or centigrade, plastic or metal back, -30°C to 110°C (approximately)	* 1	Coffee cup
2-3	Square metre shapes, paper	3-4	Containers	1	Square metre, paper
* 1	10 metre tape	*1-2	Clinical thermometers, Celsius	1	Bottle, small
2-4	Full sheets of newspaper			1	Spoon, table or tea
				1	Book
				1	Bucket of water
				1-2	Measuring spoons, plastic, 1 ml, 5 ml, 15 ml, 25 ml

Lesson 2, METRIC-METRIC EQUIVALENTS AND RELATIONSHIPS
(45 - 50 minutes)

OBJECTIVES	PROCEDURE	COMMENTS
The student will recognize and use metric equivalents and relationships among metric measurements.	1. Present or make available Information Sheet 2, Visuals 1 and 2, and Exercise 3.	
Given a metric unit, state an equivalent in a larger or smaller metric unit.	2. Discuss how the prefixes to hold print in Visuals 1 are used with the metric base units.	No attempt should be made to have students memorize all the prefixes. Those in bold print will meet most needs.
Given a cubic volume, state its litre capacity.	3. Guide students through the first two problems on Information Sheet 2, and the first three sets of items in Exercise 3.	Remind students that the metric system is a base ten decimal system like our money. Changing to larger or smaller units will usually be by multiplying or dividing by tens, hundreds, or thousands. Review decimal placement when multiplying or dividing (see Ohio Guide, <u>Let's Measure Metric</u>).
Given the volume of an object or substance, state or find its mass.	4. Guide students through the next two problems on Information Sheet 2 and items 4 - 6 in Exercise 3.	Review superscript notation or powers of ten as needed: $10^2 = 10 \times 10 = 100$ $10^3 = 10 \times 10 \times 10 = 1000$ (see <u>Let's Measure Metric</u>).
	5. Have students complete and check item 7, Exercise 3.	
	6. Use the top half of Visual 1 to show the logical relationships among: cm^2 , cm^3 , the millilitre, and 1 gram of water. Use the bottom half to show the relationship among: 10 cm^2 , 1000 cm^3 , 1 litre, and 1 kilogram. Have 1 or more students find the mass of 1 litre of water.	Results may be slightly less if water is warmer than 4°C but this is acceptable error.
	7. Have students complete item 8, Exercise 3.	
	8. Have 1 or more students demonstrate item 9, Exercise 3.	After the mass of 1 litre of sugar has been found, discuss the fact that sugar is heavier (has a greater mass) than the same volume of water. Specific gravity tells you how heavy or light something is compared to water. Sugar has a specific gravity of 1.59 or is a little heavier than one and one-half times the same volume of water. Specific gravity of substances can be found in some dictionaries, encyclopedias, science or physics texts, and technical and engineering manuals. Specific gravities (approximate) for some substances are: Water 1.0, aluminum 2.7, cement 3.0, iron 7.9, gold 19.3, gasoline 0.7, wood (white pine) 0.4, cork 0.2, air 0.001.
	9. Discuss specific gravity of sugar and other substances. Show how if a litre of water with a specific gravity of 1.0 has a mass of 1 kilogram, then a litre of cement with a specific gravity of 3.0 (3.0 times as heavy as water), would have a mass of 3 kilograms.	
	10. Tell where the specific gravity of a substance might be found, and discuss with students how this information might be used in arrangements--estimating or calculating loads for construction, transportation, and storage.	

RESOURCES

Kilogram scale
Litre beaker
Litre of water
Litre of sugar
Visual 1, *transparency
Visual 2, *transparency
*Overhead projector
Exercise No. 3

Lesson 3, SELECTING AND USING METRIC INSTRUMENTS, TOOLS AND DEVICES
 "WHICH TOOLS FOR THE JOB" AND "MEASURING UP" (two 45 to 50 minute periods)

OBJECTIVES	PROCEDURE	COMMENT
The student will recognize and use instruments, tools, and devices for measurement tasks in everyday use.	1. Assemble metric and Customary measuring tools and devices (rules, scales, $^{\circ}\text{C}$ thermometer, measuring cups, tapes, wrenches and drill bits) and display in separate groups at learning stations.	Both kinds of measuring tools and devices may be in use for a number of years. Some tools we may have dual scales--metric and Customary. We will need to look carefully to be sure which scales or devices we are using. We will need to check to make sure which measurement system is called for in a task. We will need to be very careful to clearly label all number values which are written down as measurements, and be sure we tell others what units we are talking about when we mention measurements. Without extra care, there can be a waste of time and materials, damaged materials, lost customers and unnecessary accidents.
Given metric and Customary tools, instruments, or devices, differentiate between metric and Customary.	2. Have students examine metric tools and instruments for distinguishing characteristics and compare them with Customary tools and instruments.	
Given a measurement task, select and use an appropriate tool, instrument or device.	3. Have students verbally describe characteristics.	
Given a metric measurement task, judge the metric quantity within 25% and measure within 5% accuracy.	4. Present or make available Information Sheet 3.	
RESOURCES	5. Mix metric and Customary tools or equipment at learning station. Give students Exercises 4 and 5.	
Measuring tools and devices, metric and Customary Information Sheet No. 3 Exercises 4 and 5	6. Have students practice and demonstrate their ability to select and use the metric instruments and tools to the appropriate level of precision. Check on individual performance levels as they engage in the tasks. Extend the tasks as desired.	
	7. In group follow-up, have students add suggestions to Information Sheet 3. Discuss appropriate levels of precision for the tasks in Exercises 4 and 5.	

Lesson 4, METRIC-CUSTOMARY EQUIVALENTS
(45 - 50 minutes)

OBJECTIVES

The student will recognize and use metric and Customary units interchangeably in ordering, selling, and using products and supplies.

Given a Customary (or metric) measurement, find the metric (or Customary) equivalent on a conversion table.

Given a Customary unit, state the replacement unit.

Given a metric (or Customary) amount, state the approximate Customary (or metric) amount.

RESOURCES

A few assorted consumer or occupational packages and materials--sized in quarts, gallons, pints, pounds, half-pound, inches, feet, yards
Information Sheet No. 4
Table 3
Exercise No. 6

PROCEDURE

1. Assemble and display consumer or occupational packages or sized materials at your desk or a table.
2. Show, describe and discuss some of the package and material sizes.
3. Present and make available Information Sheet 3, Table 3, and Exercise 6. Work one or more examples from items 1, 2, and 3 of Exercise 6 to insure students know what to do.
4. Have students complete Exercise 6.
5. Check answers through discussion. Discuss other possible metric-Customary equivalents of interest to the students, such as highway speeds or other units used in the occupation.

COMMENT

Avoid sizes which are awkward to relate to whole Customary units such as the 12 oz. and 3 oz. sizes.

Both measurement systems will be in use for perhaps 10 to 20 years for some products or materials. We will be changing to metric size packages and materials. Many packages and materials we use are in convenient sizes and in whole, half, or quarter portions of Customary units--pound, 5-pound, half-pound, quarter-pound, quart, pint, gallon. Note the awkward metric equivalent on a Customary package such as 454 grams when a pound is converted to metric. Discuss what metric-sized packages would be convenient and in what fractional metric units.

Point out that the Approximate Equivalents Table on Information Sheet 4 is approximate. The numbers have been rounded to convenient or easy-to-remember quantities. Greater precision is often not required. When it is, they can get precise equivalents by using conversion tables such as Table 3.

CLASSROOM ADAPTATION AND IMPLEMENTATION

1. Metric Approach. Use a "Think Metric" approach. Each learner needs to develop one or more personal references for metric units and values. Conversion formulas and factors will not be needed. Conversion tables and slides are or will be readily available. The use of approximate equivalents between the two measurement systems for common measures is legitimate from our viewpoint and will be useful during the metric changeover period. Those appear last in the unit, and that is where we believe they belong, otherwise students will be estimating measurements in Customary units and applying conversion formulas or approximate equivalents to get metric estimates. Check your students during estimation and measurement activities as they work to see that they are estimating in metric, and recording their estimates.

2. Scheduling. We recommend that you not attempt to begin the Metric Instruction during the same class period that you administer the Student Pre-Test. Try to avoid scheduling double class periods for metric instruction on the same day. Too much of the same type of activities and content can be detrimental to learning. Space the unit out over two or more weeks. This will give the students time to assimilate the concepts and experiences. However, too many intervening days can also be detrimental to learning. The student will forget the content, or assume it is not important if it is used too infrequently.

3. Classroom Adaptation.

- a. If you cannot adapt and implement a particular task or activity, be certain to let us know in your Post Instruction Instructor's Questionnaire.
- b. Substitute, extend, or amend tasks and activities as you feel you need to. But, it is important that you let us know what you did.

- c. If you cannot adapt to implement a particular task at this time that is acceptable and understandable. We believe we are working with teachers who have a history of ingenuity and creativity, and the ability to adapt in ways we could not have imagined.
- d. As an example, if a task in a Metric Package for Machine Shop trades calls for drilling a 6 mm hole and you don't have a 6 mm drill, have the student use a smaller Customary or metric drill bit, then use a reamer to ream out the hole to a 6 mm size. The important part of the learning task is, can the student make and measure a hole that is 6 mm and some other metric size which has been specified.

4. Adapting the Metric Instructional Content and Exercises. Examine Table 2, Metric Units for the Occupation, very carefully. Think about the tools and instruments and the measurements you currently use in your course which the entry-level worker will need. Consider which of the units you use or do not use in your program area.

Add to Table 2 by preparing a supplemental sheet if necessary, or by putting them up on the chalkboard. Call us, or an appropriate information source if you have questions about replacement units for Customary units and their uses. We may or may not know the answer. But we will try to find out as quickly as possible. This is also true of other information sources. For some things we will have to wait and find out what an industry or Metric Practice Committee decides to use as a standard metric practice. You might wish to let your students know what kinds of information are needed, but are not yet available, and suggest sources where they might get the information when it becomes available.

5. Hardware, Instruments, and Materials.

a. Teacher's Field Test Kit

We have provided some measuring instruments, materials, and some reference materials for your use. You will find an inventory of the materials on the bright yellow card inside your field kit.

- b. It would be helpful to have additional metre sticks, some centimetre/millimetre rulers, a few 150 centimetre tape measures, some metric scales or balances, and some millilitre/litre beakers.
- 1) Some instruments, tools, and materials you may already have.
 - 2) Check with Central Supplies* to see if you can obtain from the warehouse, metre sticks, centimetre/millimetre rules, metric balance scales, etc.
 - 3) Borrow from science, math, technology areas, auto shop, machine shop, medical technology and nursing classes, whatever metric measuring devices they may have for their classroom use.
 - 4) You might plan and coordinate the use of materials and devices with other Field Test teachers in your building or district.
 - 5) You may be able to secure empty metric vials and jugs from a pharmacy or local drug supply house.
 - 6) Many materials and devices can be made in the classroom with inexpensive and readily available materials. The Mak-a-Meter strips in your Field Test Kit can be used to make metre sticks or measuring tapes, by having students cut and glue the pieces on wood, posterboard, paper, or tape strips. You can calibrate bottles, jars, and plastic containers in millilitres and litres. You can probably make a pretty good set of mass pieces for the balance by using common objects such as washers. One of the 1 kilogram standards we are using in the workshop is a wooden index file card box filled with 1 full roll and 2 partial rolls of wire solder, with some newspaper packing. Wire solder was removed from one of the rolls until the box registered 1 kilogram on the scale. Fahrenheit thermometers could be recalibrated in Celsius by looking up the equivalents in "Let's Measure Metric" and taping over the °F scale with a °C scale.
 - 7) Centigrade thermometers may be used. The units are exactly the same, only the name has changed to Celsius, to honor the scientist.
 - 8) For the Resource Table Measurement Activities, you may wish to set up only the Linear and Area Tables on one day, then the Mass, Volume, and Temperature Tables on another day or, if you have or can make enough equipment to keep your students active, you can rotate them from other activities in the classroom, shop or lab.

c. Special Hardware Requirements for Occupational Program Areas.

Inside the guide, "Let's Measure Metric" you will find a suggested list of Metric Tools and Devices Needed to Complete Measurement Tasks for Objective 1, and a Checklist and Coding Sheet for the Metric Tools and Devices for Objectives 2 - 4. You will want to assess your needs early in your planning so that you will be able to obtain the materials you need.

WORLDWIDE AND U.S. METRICATION

The metric system is simple, logical and easy to understand. Learning it is not difficult. Few of us will reap the glee which a Charlie Brown character has portrayed in the comics--"two grams equal one grampa" or "if I see a centimetre coming into the room, I'll step on it."

Information on world-wide and U.S. metrication is useful to develop a sense of the timing and pacing of the metric changeover.

ALL INDUSTRIALIZED NATIONS HAVE CHANGED TO THE METRIC SYSTEM OR ARE ALREADY DOING SO.

Because of problems in world trade, during the 1960's, many countries met to develop a worldwide system of measurement. Even the metric countries were using different measurements and sizes in manufacturing screws, parts, and other products.

The metric system was selected as a worldwide system because it is a decimal system--based on tens--like our number system and our money. With a little practice, it is easier to use, simpler, faster, and people do not make as many mistakes.

The old metric system was brought up to date and made simpler. The new metric system is called the International System of Units (S.I.).

Among the last countries to change to the metric system are: Great Britain (1965-75), Australia (1970-80), New Zealand (1969-76), Canada (1974-79), and the United States.

Canada. In 1975, Canada began reporting temperature, and rainfall and snowfall in metric units; clinical thermometers were changed; some pet food and biscuit packages were changed; two of the six sugar refiners began to package sugar in 1 kg, 2 kg, 4 kg, 10 kg, and 40 kg packages. Changes planned



for 1976 include: newsprint and paper pulp in metric by request, all sugar packaging, the Montreal Olympics, snack foods in metric packages, the show industry, Quebec's dairy industry, and atmospheric pressure in kilopascals. By 1977, metric units will be used for automobile speedometers; all grain sales; distance, visibility, and windspeed reports; textile orders; speed limit and highway signs; and all "new" wine. In 1978 retail food will be measured on metric scales. In 1979 lumber products will be shipped in metric sizes. Canada expects that most of the change to metric will be made by 1977-78--including building products, paint, and consumer goods.

U.S. Metrication

U.S. INDUSTRIES HAVE BEEN CHANGING TO THE METRIC SYSTEM.

Many U.S. companies have changed to metric-sized products in order to trade with other countries. Our trade with other countries amounts to more than 110 billion dollars each year. Many of the things we trade are measurement sensitive.

Pharmaceutical companies changed most of their products to metric about 20 years ago. Doctors, nurses, pharmacists, and medical and dental technicians are already using many metric measures.

U.S. companies which make automobiles and trucks, earth-moving and agricultural equipment, business machines and machine tools have been changing. Most new designs are in metric--the Ford Pinto engine; General Motor's Cadillac Seville, Caterpillar Tractors, International Harvester equipment, Honeywell products, and others.

THE RATE OF CHANGE TO METRIC IS SPEEDING UP. WORLD WIDE AND U.S. CHANGEOVER IS CREATING A "SNOWBALL" EFFECT.

Machine tool companies, steel producers, makers of nuts and bolts, and other suppliers have been quick to supply U.S. manufacturers metric-sized

tools and products. In 1975, U.S. Steel and Bethlehem Steel began to supply metric-sized products.

Because we exchange many goods with Canada, some U.S. manufacturers plan to change to metric sizes when Canada changes. The U.S. metric planning committees for paint manufacturing, and lumber and wood products recommend changing to metric sizes in 1978-79, at the same time Canada makes the change. U.S. textile manufacturers are also coordinating their planning with Canadian manufacturers. The nine European Economic Community countries will require all products imported after 1977 to be labeled in metric, or produced and labeled in metric sizes. Some U.S. industries will change to metric sizes soon, rather than change to metric labeling; then change to metric sizes.

Many companies plan to convert to the metric system. These include:

A.B. Dick, Allis-Chalmers, Armco Steel, Brown and Sharpe (machine tools) Caterpillar Tractor, Chrysler, Clark Equipment, Coca-Cola, Dow-Corning, Ford, General Motors, General Tire and Rubber, Hewlett-Packard (electronics), New England Medical Center Hospital, Rockwell International, Sears, Seven-Up, 3M, and Xerox.

GM had planned to introduce their first metric car in 1978, but rushed the newly designed Seville into production in 1975. The Chevette is also a metric car. GM plans to change completely to metric by 1982--including relabeling replacement parts in metric sizes.

Many U.S. workers are using the metric system or are learning on the job-- designers and draftsmen, tool and die makers, machine tool operators, assemblers, inspectors, office personnel, advertising and sales workers, and shipping and receiving clerks. New labor contracts often say that the company will supply workers with the metric tools they need.

Retail stores such as J.C. Penney and Sears have metric planning committees and have metric training materials for their workers, and teachers and consumers.

The national Bureau of Standards has a metric Information office which is helping with the change. The National Aeronautics and Space Administration uses metric units in their reports. The Maritime Administration will change the merchant marine to the metric system by 1980.

In 1975, the Department of Defense said they will use the metric system whenever practical and consider it in all purchases of supplies and services especially for newly-designed materials. Business which contract with the government will probably want to change as soon as possible to get the business.

Many other government agencies plan to change to the metric system.

In 1975, U.S. industry agreed with the International Standards Organization on a new system of metric bolts and nuts. U.S. industry will probably change to metric sizes more quickly now.

A U.S. Metric Bill was passed in December, 1975. It says that the nation is changing to metric, and provides a national committee to help plan the changeover.

MANY STATES ALREADY HAVE PLANS FOR METRIC EDUCATION IN THEIR SCHOOLS.
MANY TEACHERS AND STUDENTS ARE LEARNING THE METRIC SYSTEM.

In 1975 Congress established a Metric Education Office in the Office of Education and approved spending up to 10 million dollars each year until 1978, to help prepare teachers and students to use the metric system.

At least 32 states plan to change to the metric system in their schools. Many school districts have metric coordinators. Several are training teachers and students in the metric system. Some states have set dates for beginning or completing the change to the metric system in their schools. Beginning in

1976, California, Oregon, Texas and Arizona say that new textbooks must contain mostly metric measurement. California says the metric system will become the "primary system" of measurement taught and used in the schools. Metric education began in their school in 1975-76 for grades 7 - 12. By 1979-80 it is to be the "first language" of measurement for grades K - 6. And, by 1980-81 they say that only metric measurement will be used in their schools. Many other states have similar plans.

APPENDIX V-A

Vocational-Technical Instructor's Questionnaire

FORM A

OMB No. 51-S76021
Expires October, 1976

INSTRUCTOR'S QUESTIONNAIRE

Introduction

The basic purpose of the evaluation, of which this questionnaire is a part, is to obtain your professional opinions regarding the quality of the Metric Instructional Package for your program. More specifically, the intent is to get your reactions, *both good and bad*, concerning that package and its associated materials and activities.

Your participation in the evaluation of these new instructional materials is very important. *You* are the *sole* source of any information regarding the workings of these materials with your students. Also, your class is one of only a very few groups that are involved in the total evaluation effort.

Before you begin filling out this questionnaire, there are several points which you should remember. FIRST, YOUR PARTICIPATION IN THIS EVALUATION IS VOLUNTARY AND THERE IS NO PENALTY FOR NON-PARTICIPATION. Second, you are encouraged *not* to respond to any item about which you feel reluctant. Finally, your name is requested *only* so we will be able to correctly match sets of data, e.g., this questionnaire and the POST-INSTRUCTION QUESTIONNAIRE you will be asked to complete.

Metric Education Project
The Center for Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

1976

Part I: BACKGROUND DATA

The purpose of this set of items is to obtain background information about you and your students. Please answer each question as honestly and frankly as possible. Indicate your answers either by filling in the blanks or by circling the letter in front of the choice which you feel is the *best* response.

1. NAME: _____
2. DATE: _____
3. SCHOOL: _____
4. CITY AND STATE: _____
5. How many hours of training in metric and metric education have you had prior to this time?
(_____ hours)
6. Up to this point in your career, how many hours of experience have you had teaching the metric system? (_____ hours)
7. Are you?
 - A. Male
 - B. Female
8. How old are you? (_____ years)
9. What is your highest level of education?
 - A. High school
 - B. Some college
 - C. Bachelor's degree
 - D. Master's degree
 - E. Doctor's degree
 - F. Other (please explain) _____

Part II: GENERAL ATTITUDE

The items in this part of the questionnaire deal with your more generalized attitudes toward the metric system and metric education. Since there are no right or wrong answers, please respond to each item as honestly and frankly as you can.

ITEMS:	CHECK ONE PER ITEM				
	STRONGLY AGREE	AGREE	NO OPINION	DISAGREE	STRONGLY DISAGREE
10. If the United States keeps trading with other nations, it is important that we measure and sell goods in metric units.					
11. I feel it is very important that we all learn the metric system immediately.					
12. We haven't changed to the metric system yet, and there probably won't be much need for us to do so in the near future.					
13. A working knowledge of the metric system would be very helpful to me in my personal life (for example, when shopping for food or working around my home).					
14. Knowing how to use the metric system would be very helpful when I am doing everyday tasks.					
15. It's very unusual for me to ever hear or read about anything that involves using metric units.					
16. I believe the United States will change to the metric system a great deal more rapidly in the next five years.					
17. I try to use the metric system and metric units whenever possible.					
18. Only people in certain special jobs will ever need to know the metric system.					

APPENDIX V-B

Vocational-Technical Teacher's Post-test Questionnaire

FORM B

OMB No. 51-S76021
Expires October, 1976

INSTRUCTOR'S QUESTIONNAIRE

Introduction

The basic purpose of the evaluation, of which this questionnaire is a part, is to obtain your professional opinions regarding the quality of the Metric Instructional Package used in your program. More specifically, the intent is to get your reactions, *both good and bad*, concerning the Package and its associated materials and activities.

Your participation in the evaluation of these new instructional materials is very important. You are the *sole* source of any information regarding the workings of these materials with your students. Also, your class is one of only a very few groups that are involved in the total evaluation effort.

Before you begin filling out this questionnaire, there are several points which you should remember. FIRST, YOUR PARTICIPATION IN THIS EVALUATION IS VOLUNTARY AND THERE IS NO PENALTY FOR NON-PARTICIPATION. Second, you are encouraged *not* to respond to any item about which you feel reluctant. Finally, your name is requested *only* so we will be able to correctly match sets of data, e.g., this questionnaire and the PRE-INSTRUCTION QUESTIONNAIRE you were asked to complete earlier.

The Center for Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

1976

NAME: _____

DATE: _____

Part I: General Attitude

The items in this part of the questionnaire deal with your more generalized attitudes toward the metric system and metric education. Since there are no right or wrong answers, please respond to each item as honestly and frankly as you can.

CHECK ONE PER ITEM

ITEMS:	<i>strongly agree</i>	<i>agree</i>	<i>no opinion</i>	<i>disagree</i>	<i>strongly disagree</i>
1. A working knowledge of the metric system would be very useful to me in my personal life (for example, when shopping for food or working around my home).					
2. We haven't changed to the metric system yet, and there probably won't be much need for us to do so in the near future.					
3. It is very unusual for me to ever hear or read about anything that involves using metric units.					
4. If the United States keeps trading with other nations, it is important that we measure and sell goods in metric units.					
5. I feel it is very important that we all learn the metric system immediately.					
6. I believe the United States will change to the metric system a great deal more rapidly in the next five years.					
7. Knowing how to use the metric system would be very helpful when I am doing everyday tasks.					
8. Only people in certain special jobs will ever need to know the metric system.					
9. I try to use the metric system and metric units whenever possible.					

Part II: GENERAL CONCERNS AND ISSUES

The purpose of this set of items is to obtain your reactions toward several more general issues and concerns related to this instructional package. You are to indicate your response to each item either by filling in the blanks or by circling the letter in front of the option provided which best expresses your feelings. You are also encouraged to express any comments or reservations you may have regarding the topics considered in the spaces provided. If additional room is needed, feel free to write on the back of the page.

10. Were you prepared to teach the package?
 - A. Yes, even before the related in-service training.
 - B. Yes, after receiving the in-service training.
 - C. No, I was not as prepared as I would have liked.
 - D. No, I was uncomfortable teaching the package.

11. About how many *total* hours of actual classtime did you spend covering the materials in this package? (_____ hours).

12. On the average, how long was each session during which you used the materials in this package? (_____ hours).

13. Did you use the materials in the package exactly in the order in which they are organized?
 - A. Yes.
 - B. No (Please explain the changes you made!) _____

14. Are there any students for whom you would *not* recommend the use of this package?
 - A. No
 - B. Yes (Please describe the types of students!) _____

15. How appropriate were the materials, examples, etc. used in the package for your course?

- A. Very appropriate
- B. Somewhat appropriate
- C. Very inappropriate

COMMENTS:

16. Would you use this Metric Instructional Package again?

- A. Yes, without any changes being made on it.
- B. Yes, but only if a few important changes are made in it.
- C. Yes, but only if major changes are made in it.
- D. No

17. Would you recommend this package to other teachers?

- A. Yes, quite strongly
- B. Yes, somewhat
- C. Yes, but not very strongly
- D. No

18. Overall, how would you rate the quality of this package?

- A. Excellent
- B. Very Good
- C. Good
- D. Average
- E. Poor

COMMENTS:

19. The directions for using this package were clearly written and complete.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

20. The "Metric Content" contained in the package was clearly written.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

21. The section, "Teaching and Learning Metric," is clearly written and complete.

A. Strongly agree
 B. Agree
 C. No opinion
 D. Disagree
 E. Strongly disagree

COMMENTS:

22. Generally speaking, the "Metric Content" contained in the package was written at an appropriate level for most of my students.

A. Strongly agree
 B. Agree
 C. No opinion
 D. Disagree
 E. Strongly disagree

COMMENTS:

23. Teaching the materials in this package took up too much time.

A. Strongly agree
 B. Agree
 C. No opinion
 D. Disagree
 E. Strongly disagree

COMMENTS:

24. The organization or format of the package facilitated the instructional process and made it easier.

A. Strongly agree
 B. Agree
 C. No opinion
 D. Disagree
 E. Strongly disagree

COMMENTS:

25. As we were going through these materials, I found that the students had difficulty "thinking metric."

A. Strongly agree
 B. Agree
 C. No opinion
 D. Disagree
 E. Strongly disagree

COMMENTS:

26. I feel this package will fit very well into my regular instructional program.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

27. In the spaces below, describe the two things you liked most about this package.

(A) First:

(B) Second:

Part III: SPECIFIC CHANGES AND MODIFICATIONS

During this part of the questionnaire, please answer each of the following questions as they pertain to each of the specified parts of the instructional package which you used. Use the next page if additional space is needed. YOUR RESPONSES TO THESE QUESTIONS ARE VERY IMPORTANT.

SPECIFIC PARTS OF THE PACKAGE	HOW WOULD YOU RATE EACH PART OF THE PACKAGE IN TERMS OF ITS USEFULNESS?	WHAT ONE MAJOR PROBLEM DID YOU SEE IN EACH PART OF THE PACKAGE, AND HOW WOULD YOU SUGGEST THAT PROBLEM BE ALLEVIATED OR RESOLVED?	
28. Objectives	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	(a) Problem:	(b) Suggested Resolutions:
29. Learning Activities	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	(a) Problem:	(b) Suggested Resolutions:
30. Metric Content	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	(a) Problem:	(b) Suggested Resolutions:
31. Visual Aids	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	(a) Problem:	(b) Suggested Resolutions:
32. Student Exercises	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	(a) Problem:	(b) Suggested Resolutions:
33. Metric References	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	(a) Problem:	(b) Suggested Resolutions:
34. In-Service Training	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	(a) Problem:	(b) Suggested Resolutions:
35. Student Tests	☐ Very Useful ☐ Somewhat Useful ☐ Not Useful	(a) Problem:	(b) Suggested Resolutions:

APPENDIX V-C

Vocational Student's Pre-test Questionnaire

FORM A

OMB No. 51-S76021
Expires October, 1976

STUDENT TEST BOOKLET

for

METRICS FOR PETROLEUM MARKETING

Introduction

This test will help us to improve a new set of materials. It is important that you do a good job and answer all the questions on this test as best you can, because your performance will tell us how the metric materials will work in an actual classroom.

Before you begin to answer any of the test questions, there are several important things you should know. First, **YOUR PARTICIPATION IS VOLUNTARY AND THERE IS NO PENALTY FOR NON-PARTICIPATION.** Second, you do not have to answer any question you don't want to. Also, your name has been coded so we will be able to match your pretest and posttest.

Directions

Part I and Part II of the test contain multiple-choice questions. Read each question carefully. Then, read each of the possible answers below the question. After that, pick the letter next to the answer you think is best. Use your pencil to completely black out the letter on your answer sheet.

The following example should help you understand what you are to do.

Example:

1. Which of the following is the name of a unit of length?

- [A] second
[B] foot
[C] pound
[D] quart

Answer Sheet

1	[A]	☒	[C]	[D]	[E]
2	[A]	[B]	[C]	[D]	[E]

Did you read the question? Did you read each of the possible answers below the question? Which answer is best? . . . Yes, a foot is a unit of length. So, the letter [B] is crossed out on your answer sheet.

Do you understand what you are to do? If you do not understand, raise your hand and your teacher will help you.

When you understand what to do, turn the page and answer the rest of the questions.



THE CENTER FOR VOCATIONAL EDUCATION

The Office of Vocational Education • 1900 Kenny Road • Columbus, Ohio 43210

Part I - Directions:

The items in this part of the test concern your feelings and attitudes toward the metric system. There are no right or wrong answers. So please respond to each item as honestly and frankly as you can.

ITEMS:	CHOOSE ONE ANSWER PER ITEM				
	STRONGLY AGREE	AGREE	NO OPINION	DISAGREE	STRONGLY DISAGREE
1. If the United States keeps trading with other nations, it is important that we measure and sell goods in metric units.	[A]	[B]	[C]	[D]	[E]
2. I feel it is very important that we all learn the metric system as soon as possible.	[A]	[B]	[C]	[D]	[E]
3. We haven't changed to the metric system yet, and there probably won't be much need for us to do so in the near future.	[A]	[B]	[C]	[D]	[E]
4. A working knowledge of the metric system would be very helpful to me in my personal life (for example, when shopping for food or working around my home).	[A]	[B]	[C]	[D]	[E]
5. Knowing how to use the metric system would be very helpful when I am doing everyday tasks.	[A]	[B]	[C]	[D]	[E]
6. It's very unusual for me to ever hear or read about anything that involves using metric units.	[A]	[B]	[C]	[D]	[E]
7. I believe the United States will change to the metric system a great deal more rapidly in the next five years.	[A]	[B]	[C]	[D]	[E]
8. I try to use the metric system and metric units whenever possible.	[A]	[B]	[C]	[D]	[E]
9. Only people in certain special jobs will ever need to know the metric system.	[A]	[B]	[C]	[D]	[E]

Petroleum Marketing
Form A

Part II

10. One hundred twenty-five grams is about the mass of a:
- [A] Volkswagen "Beetle"
 - [B] shoestring
 - [C] hamburger
 - [D] new-born baby
11. The square metre is about the area of:
- [A] a postage stamp
 - [B] a card table top
 - [C] a bedspread
 - [D] this sheet of paper
12. Spark plug gaps, drill bit diameters, hose diameters, and wrench sizes are measured in:
- [A] millilitres
 - [B] millimetres
 - [C] centimetres
 - [D] milligrams
13. Fuel is measured in:
- [A] kilograms
 - [B] metres
 - [C] millilitres
 - [D] litres
14. The correct way to write twenty grams is:
- [A] 20 g.
 - [B] 20 g
 - [C] 20 Gm.
 - [D] 20 gms
15. The correct way to write twelve thousand millilitres is:
- [A] 12,000 ml
 - [B] 12.000 ml
 - [C] 12 000ml
 - [D] 12 000 ml
16. A container having a volume of 1000 cubic centimetres would hold:
- [A] 100 litres
 - [B] 10 litres
 - [C] 1000 litres
 - [D] 1 litre
17. A container holding 1 millilitre has a volume of:
- [A] 1 cubic metre
 - [B] 1 cubic kilogram
 - [C] 1 cubic centimetre
 - [D] 1 square metre
18. Fifteen litres of water has a mass of:
- [A] 15 grams
 - [B] 150 kilograms
 - [C] 150 grams
 - [D] 15 kilograms
19. Ten millilitres of water has a mass of:
- [A] 1 kilogram
 - [B] 10 grams
 - [C] 10 kilograms
 - [D] 1 gram
20. A car 200 centimetres wide also has a width of:
- [A] 200 metres
 - [B] 2000 metres
 - [C] 2 metres
 - [D] 0.2 metre
21. A service bay 525 centimetres by 780 centimetres is:
- [A] 5.25 metres x 7.8 metres
 - [B] 0.525 metre x 0.078 metre
 - [C] 0.525 metre x 78 metres
 - [D] 5.25 metres x 0.78 metre

Petroleum Marketing
Form A

22. To measure in millimetres you would use a:

[A] rule
[B] scale
[C] pressure gage
[D] measuring cup

23. For measuring tire pressure, you would use a gage marked in:

[A] Celsius
[B] kilopascals
[C] pascals
[D] kilograms

24. Estimate the length of the line below:



[A] 23 grams
[B] 14 pascals
[C] 8 centimetres
[D] 40 millimetres

25. Estimate the length of the line below:



[A] 2 centimetres
[B] 10 millimetres
[C] 23 milligrams
[D] 4 pascals

Use this conversion table to answer questions 26 and 27.			
mm	in.	mm	in.
100	3.94	10	0.39
200	7.87	20	0.79
300	11.81	30	1.18
400	15.74	40	1.57
500	19.68	50	1.97
600	23.62	60	2.36
700	27.56	70	2.76
800	31.50	80	3.15
900	35.43	90	3.54

26. Find the equivalent; 230 mm is:

[A] 8.05 in.
[B] 9.05 in.
[C] 2.30 in.
[D] 23.0 in.

27. Find the equivalent; 320 mm is:

[A] 12.60 in.
[B] 32.0 in.
[C] 3.20 in.
[D] 12.0 in.

28. The metric unit which replaces the gallon is:

[A] kilopascal
[B] litre
[C] millilitre
[D] kilogram

29. The metric unit which replaces horsepower is:

[A] kilowatt
[B] kilokelvin
[C] kilopower
[D] kilopascal

30. Fifteen metres of hose is about:

[A] 50 yards
[B] 50 inches
[C] 50 feet
[D] 3 yards

31. A ten pound package is about:

[A] 4 kilograms
[B] 2 kilograms
[C] 20 kilograms
[D] 5 kilograms

APPENDIX V-D

Vocational Student's Post-test Questionnaire

FORM B

OMB No. 51-S76021
Expires October, 1976

STUDENT TEST BOOKLET
for
METRICS FOR PETROLEUM MARKETING

Introduction

This test will help us to improve a new set of materials. It is important that you do a good job and answer all the questions on this test as best you can, because your performance will tell us how the metric materials will work in an actual classroom.

Before you begin to answer any of the test questions, there are several important things you should know. First, **YOUR PARTICIPATION IS VOLUNTARY AND THERE IS NO PENALTY FOR NON-PARTICIPATION.** Second, you do not have to answer any question you don't want to. Also, your name has been coded so we will be able to match your pretest and posttest.

Directions:

Part I and Part II of the test contain multiple-choice questions. Read each question carefully. Then, read each of the possible answers below the question. After that, pick the letter next to the answer you think is best. Use your pencil to completely black out the letter on your answer sheet.

The following example should help you understand what you are to do.

Example

1. Which of the following is the name of a unit of length?

- [A] second
[B] foot
[C] pound
[D] quart

Answer Sheet

1	[A]	☒	[C]	[D]	[E]
2	[A]	[B]	[C]	[D]	[E]

Did you read the question? Did you read each of the possible answers below the question? Which answer is best? . . . Yes, a foot is a unit of length. So, the letter [B] is crossed out on your answer sheet.

Do you understand what you are to do? If you do not understand, raise your hand and your teacher will help you.

When you understand what to do, turn the page and answer the rest of the questions.



THE CENTER FOR VOCATIONAL EDUCATION

The Ohio State University • 1960 Kenny Road • Columbus, Ohio 43210

Part I - Directions:

The items in this part of the test concern your feelings and attitudes toward the metric system. There are no right or wrong answers. So please respond to each item as honestly and frankly as you can.

ITEMS:	CHOOSE ONE ANSWER PER ITEM				
	STRONGLY AGREE	AGREE	NO OPINION	DISAGREE	STRONGLY DISAGREE
1. If the United States keeps trading with other nations, it is important that we measure and sell goods in metric units.	[A]	[B]	[C]	[D]	[E]
2. I feel it is very important that we all learn the metric system as soon as possible.	[A]	[B]	[C]	[D]	[E]
3. We haven't changed to the metric system yet, and there probably won't be much need for us to do so in the near future.	[A]	[B]	[C]	[D]	[E]
4. A working knowledge of the metric system would be very helpful to me in my personal life (for example, when shopping for food or working around my home).	[A]	[B]	[C]	[D]	[E]
5. Knowing how to use the metric system would be very helpful when I am doing everyday tasks.	[A]	[B]	[C]	[D]	[E]
6. It's very unusual for me to ever hear or read about anything that involves using metric units.	[A]	[B]	[C]	[D]	[E]
7. I believe the United States will change to the metric system a great deal more rapidly in the next five years.	[A]	[B]	[C]	[D]	[E]
8. I try to use the metric system and metric units whenever possible.	[A]	[B]	[C]	[D]	[E]
9. Only people in certain special jobs will ever need to know the metric system.	[A]	[B]	[C]	[D]	[E]

Part II

10. A service bay 525 centimetres by 780 centimetres is:
- [A] 5.25 metres x 7.8 metres
 - [B] 0.525 metre x 0.078 metre
 - [C] 0.525 metre x 78 metres
 - [D] 5.25 metres x 0.78 metre
11. The metric unit which replaces horsepower is:
- [A] kilowatt
 - [B] kilokelvin
 - [C] kilowatt
 - [D] kilopascal
12. The metric unit which replaces the gallon is:
- [A] kilopascal
 - [B] litre
 - [C] millilitre
 - [D] kilogram
13. To measure in millimetres you would use a:
- [A] rule
 - [B] scale
 - [C] pressure gage
 - [D] measuring cup
14. A car 200 centimetres wide also has a width of:
- [A] 200 metres
 - [B] 2000 metres
 - [C] 2 metres
 - [D] 0.2 metre
15. The correct way to write twelve thousand millilitres is:
- [A] 12,000 ml
 - [B] 12.000 ml
 - [C] 12 000ml
 - [D] 12 000 ml
16. The square metre is about the area of:
- [A] a postage stamp
 - [B] a card table top
 - [C] a bedspread
 - [D] this sheet of paper
17. A container having a volume of 1000 cubic centimetres would hold:
- [A] 100 litres
 - [B] 10 litres
 - [C] 1000 litres
 - [D] 1 litre
18. Ten millilitres of water has a mass of:
- [A] 1 kilogram
 - [B] 10 grams
 - [C] 10 kilograms
 - [D] 1 gram
19. One hundred twenty-five grams is about the mass of a:
- [A] Volkswagen "Beetle"
 - [B] shoestring
 - [C] hamburger
 - [D] new-born baby
20. The correct way to write twenty grams is:
- [A] 20 g.
 - [B] 20 g
 - [C] 20 Gm.
 - [D] 20 gms
21. Fuel is measured in:
- [A] kilograms
 - [B] metres
 - [C] millilitres
 - [D] litres

Petroleum Marketing
Form B

22. Estimate the length of the line below:



- [A] 23 grams
- [B] 14 pascals
- [C] 8 centimetres
- [D] 40 millimetres

23. Estimate the length of the line below:



- [A] 2 centimetres
- [B] 10 millimetres
- [C] 23 milligrams
- [D] 4 pascals

24. For measuring tire pressure, you would use a gage marked in:

- [A] Celsius
- [B] kilopascals
- [C] pascals
- [D] kilograms

25. Spark plug gaps, drill bit diameters, hose diameters, and wrench sizes are measured in:

- [A] millilitres
- [B] millimetres
- [C] centimetres
- [D] milligrams

26. Fifteen litres of water has a mass of:

- [A] 15 grams
- [B] 150 kilograms
- [C] 150 grams
- [D] 15 kilograms

27. A container holding 1 millilitre has a volume of:

- [A] 1 cubic metre
- [B] 1 cubic kilogram
- [C] 1 cubic centimetre
- [D] 1 square metre

Use this conversion table to answer questions 28 and 30.

mm	in.	mm	in.
100	3.94	10	0.39
200	7.87	20	0.79
300	11.81	30	1.18
400	15.74	40	1.57
500	19.68	50	1.97
600	23.62	60	2.36
700	27.56	70	2.76
800	31.50	80	3.15
900	35.43	90	3.54

28. Find the equivalent;
320 mm is:

- [A] 12.60 in.
- [B] 32.0 in.
- [C] 3.20 in.
- [D] 12.0 in.

29. Fifteen metres of hose is about:

- [A] 50 yards
- [B] 50 inches
- [C] 50 feet
- [D] 3 yards

30. Find the equivalent;
230 mm is:

- [A] 8.05 in.
- [B] 9.05 in.
- [C] 2.30 in.
- [D] 23.0 in.

31. A ten pound package is about:

- [A] 4 kilograms
- [B] 2 kilograms
- [C] 20 kilograms
- [D] 5 kilograms

Part III: DIRECTIONS

During the past several weeks, your class has been using new instructional materials that deal with the metric system. The purpose of the items in this part of the test is to get your reactions concerning what you liked and didn't like about those materials.

It is extremely important that you answer each of the questions listed. Your comments and suggestions will be used directly to help improve materials and activities.

32. Think about the materials, activities, and other experiences related to the metric system which we have dealt with over the past several weeks. *What one thing* related to those experiences *did you enjoy most?*

33. *What one thing* related to our experiences with the metric system *did you dislike most?*

34. How do you think the problem you identified in question 33 can best be resolved or eliminated?

APPENDIX V-E

Student Characteristics Instrument

APPENDIX VI-A

Adult Basic Education (ABE)
Advisory Committee on Metric Education

ABE Advisory Committee

John L. Baird
Chief, Program Service Branch
Division of Adult Education
BOAE/USOE, ROB #3
7th and D Streets, S.W.
Washington, D.C. 20201
(202) 245-9751

Max Bell
Associate Professor of Education
Graduate School of Education
5835 S. Kimbark
Chicago, IL 60637
(312) 753-4165

Anna Mae Burdi
Supervisor, ABE
Ferndale High School
881 Pinecrest
Ferndale, MI 48220
(313) 542-2535

John Hatfield
Project Director
ABE Staff Development
Region V
750 Brooksedge Blvd.
Westerville, OH 43081
(614) 891-2733

Myrna Hugi
Program Officer
BOAE/USOE, ROB #3
7th and D Streets, S.W.
Washington, D.C. 20201

James Miller
Assistant Director
Division of Federal Assistance
Adult Basic Education
Ohio Dept. of Education
933 High Street
Worthington, OH 43085
(614) 466-8604

Norvell Northcutt
Director, APL Project
University of Texas
Division of Extension
103 Extension Building
Austin, TX 78712
(512) 471-4623

Patsy Patterson
ABE Curriculum Specialist,
Teacher
AE Center
2064 Stearns Road
Cleveland, OH 44106
(216) 791-8717

Mary Reiss
Director, Continuing Education
New York State Education Dept.
55 Elk Street, Room 311
Albany, NY 12234
(518) 474-5808

M. Eldon Schultz
Senior Program Officer
Region V
Adult Education Programs
U.S. Office of Education, DHEW
300 S. Wacker Drive, 32nd Floor
Chicago, IL 60606
(312) 353-6843

APPENDIX VI-B

Report of Findings
ABE Advisory Committee

ADULT BASIC EDUCATION (ABE)
ADVISORY COMMITTEE ON METRIC EDUCATION

February 3, 1975

Conference Agenda

9:30	Introduction to the Center	Robert E. Taylor
10:00	Development and Utilization of Metric Education Instructional Materials	Gloria S Cooper Anne E. Stakelon
10:30	Metric Competencies and Attitudes	Edward Hauck Dwayne Channell
11:30	What does "Everyman" Really Need From School Mathematics	Max Bell
12:15	Luncheon	Center for Tomorrow
1:15	ABE Student Needs	John L. Baird
1:30	Adult Performance Level Study	Norvell Northcutt
2:00	Committee Input to Project Design	Gloria S Cooper Joel H. Magisos
	-Identification of Math Materials -Format of Instructional Packages -Criteria for Urban Center Test Site Selection -ABE Teacher Characteristics and Needs -Program and Product Dissemination and Utilization Strategies	
3:30	Summary and New Directions	Gloria S Cooper

Project Staff

Ms. Gloria S Cooper,
Co-director

Dr. Joel H. Magisos,
Co-director

Dr. Edward Hauck,
Research Specialist

Ms. Anne Stakelon,
Program Assistant

Mr. Dwayne Channell,
Graduate Research Associate

Ms. Jacqueline Parris,
Project Secretary

Dr. Robert E. Taylor, Center Director

ABE Advisory Committee Findings

This is a summary of the ABE Advisory Committee input into our project design.

The discussion during this session focused on four issues, including (1) ABE teacher characteristics and needs, (2) format, content, and teaching strategies for instructional packages, (3) identification of math materials, and (4) criteria for urban center test site selection. The following is a summary of ideas which were presented.

ABE TEACHER CHARACTERISTICS AND NEEDS

Since the needs of ABE students and their teachers were perceived to be similar, the advisory panel agreed that both the in-service and student materials developed by project staff should consist of the same type of instructional packages. Teachers who are taught with an activity-oriented approach will use these same teaching strategies with their students. Perhaps the metric instructional package could be developed in steps or modules, so that both teachers and students would start the beginning level and proceed through the same materials, with teachers possibly going on through more advanced levels.

It cannot be assumed that students or teachers have the basic measurement and counting skills which will most often be needed by adults. Therefore, metric materials should start with beginning concepts of measurement to develop needed skills. The ideas of estimation and reasoning, rather than exact measuring, should be stressed.

Teachers and students will need support and reassurance. They need to experience success while learning in order to offset negative feelings they have already developed about mathematics.

For ABE teachers, in particular, there is a need to become familiar with and to feel at ease in teaching new content areas. Teachers feel that they must serve as "experts" for students in important daily life situations. They, therefore, experience extreme discomfort when they are challenged relative to their knowledge on a given subject. The ABE teacher finds it extremely difficult to say, "I don't know."

There will be a need to overcome resistance from teachers and students to learning the unfamiliar metric system. The use of competency-based teacher materials can increase teacher motivation to master required skills.

Motivation is especially important for adults. The need to learn this new material must be readily perceived by teachers and students. Metrics will be difficult to accept during the nation's transition period, while customary measures are still being widely used.

Materials should repeatedly stress the advantages of the metric system (i.e., its base 10 nature, its logical and easy-to-remember relationships between length, volume, and mass). Materials should use "think metric" strategies in order to overcome the initial tendency on the part of teachers to use conversion tables and devices as aids. The idea of teaching measurement, with metrics as a vehicle for communicating basic measurement skills, should be stressed.

FORMAT, CONTENT, AND TEACHING STRATEGIES FOR INSTRUCTIONAL PACKAGES

Considerations of teacher and student needs led to a discussion of what form of instructional materials could best meet these needs. The consensus was that teachers turn to prescriptive materials only out of desperation, when no better teaching materials are readily available.

The fact that ABE teachers do not have much time for planning lessons indicated that materials should be easy to use with simple, clear-cut instructor guidelines. Simplicity of instructions and language (using 6th grade language levels) was emphasized. An outline approach was suggested. Another possible approach for teacher guides was that of a diary.

It was agreed that packages should provide opportunities to create and use measuring tools. For most adults, advanced knowledge of metrics is not needed. What is necessary are the experiences required to internalize the simple metric concepts. The existing skills of ABE teachers and students could be used to advantage in providing such experiences.

"Hands-on" materials were viewed as an integral part of any metric instructional package. There may be some problems in overcoming the idea that learning depends only upon books and reading. However, despite possible resistance, the experiential, activity-oriented approach was thought to be the best way to present metric information. It was agreed that "things," rather than pictures or other representations of things, should be used throughout instruction.

For in-service training, it was suggested that teachers be directed to create their own materials. Often both students and teachers will prefer working with materials which they have created, in contrast to receiving pre-packaged, ready-to-use kits. The activities involved in making such materials can also provide a direct way to learn about the metric system. The idea of developing a kit of templates for teachers to use in creating their own measuring instruments was presented.

IDENTIFICATION OF MATH MATERIALS

The Metric Education Project stated a need to identify those materials which are presently being used with ABE students to teach math and measurement skills. Such materials could be adapted by the project staff for use in metric instructional packages. The consensus was that there are no particularly exemplary math materials currently in use with ABE students.

A suggestion was made that curriculum materials for math educators might serve as useful model for the in-service and ABE components of the project. Three sources of materials were mentioned, including (1) The Nuffield Project, (2) The University of Indiana, and (3) The University of Chicago. Efforts will be made to acquire materials from these sources for the metric project staff.

CRITERIA FOR URBAN CENTER TEST SITE SELECTION

Six factors were presented for consideration in the selection of urban center test sites.

1. It was believed that a center with a full-time director would be desirable.
2. Similarly, full-time vs. part-time center staff would be a significant consideration.
3. Support of appropriate ABE State Directors was considered important in insuring the project's success.
4. The drafting of a letter of agreement, to be signed by the Center Director, the Superintendent, and the State Director, would also be essential to project effectiveness. Such a letter would clearly state the commitments required for the project from the Center.
5. Centers with a diversified student body were to be preferred. Students should represent a broad range of abilities, ages, and cultural and racial backgrounds.
6. Centers must be committed to sharing the costs of the project (e.g., providing teacher time). Such a commitment, which is necessary in terms of project funding, will also increase the motivation of the Center for the project to be successful.

SUMMARY

The Metric Education Project was viewed as a second chance for ABE students to develop general measurement and estimation skills.

The committee agreed to react to instructional materials prior to their use in the classroom. It was determined to send members of the committee a list of potential instructional strategies within 3 weeks of this meeting. The committee agreed to react to this list within 2 weeks of receipt.

APPENDIX VII-A

Objectives and Sub-objectives
ARE Metric Instructional Materials
Level I

OBJECTIVE:

For the terms metre and centimetre, the student will recognize and use the appropriate units and symbols. Students will select, use, and read the appropriate linear measuring instrument (metre stick, metric tape measure, or centimetre ruler).

AUDIO TAPELEARNING ACTIVITIES

After completing Section A, the student will be able to. . .

- | | |
|--|--|
| 1. Read the words <u>metre</u> and <u>centimetre</u> and the symbols <u>m</u> and <u>cm</u> . | 1. State or show a physical reference for metre and for centimetre. |
| 2. Recognize the written words <u>high</u> , <u>height</u> ; <u>wide</u> , <u>width</u> ; <u>long</u> , <u>short</u> , <u>length</u> . | 2. Estimate the height, width, or length of large objects in metres to within 25% of their actual size. |
| 3. Select a metre stick as the appropriate measuring device when asked to measure large objects. | 3. Estimate the height, width, or length of small objects in centimetres to within 25% of their actual size. |
| 4. Select a centimetre ruler as the appropriate measuring instrument when asked to measure the linear dimension of small objects. | 4. Read metre sticks, metric tape measures, and centimetre rulers correctly. |
| | 5. Measure the linear dimensions of large objects in centimetres to within 10% of their actual size. |
| | 6. Measure the linear dimensions of small objects in centimetres to within 10% of their actual size. |
| | 7. Write metric quantities using the symbols <u>cm</u> and <u>m</u> . |



OBJECTIVE:

For the terms gram and kilogram, the student will recognize and use the appropriate measurement units and symbols. Students will select, use, and read the appropriate measuring instrument (gram scale or kilogram scale).

AUDIO TAPELEARNING ACTIVITIES

After completing Section B. the student will be able to. . .

- | | |
|---|--|
| 1. Read the words <u>kilogram</u> and <u>gram</u> and the symbols <u>kg</u> and <u>g</u> . | 1. Estimate the weight of heavy objects (25 kg or less) in kilograms to within 25% of their actual weight. |
| 2. Recognize the written words <u>weight</u> , <u>weigh</u> , <u>scale</u> , <u>measure</u> , <u>light</u> , <u>heavy</u> , <u>large</u> , <u>small</u> , <u>kilogram scale</u> , and <u>gram scale</u> . | 2. Estimate the weight of light objects in grams to within 25% of their actual weight. |
| 3. Select a kilogram scale as the appropriate measuring instrument when asked to weigh heavy objects. | 3. Read a kilogram scale and a gram scale correctly. |
| 4. Select a gram scale as the appropriate measuring instrument when asked to weigh light objects. | 4. Measure the weight of heavy objects in kilograms to within 10% of their actual weight. |
| | 5. Measure the weight of light objects in grams to within 10% of their actual weight. |
| | 6. Write kilogram quantities using the symbol <u>kg</u> and gram quantities using the symbol <u>g</u> . |

OBJECTIVE:

For the terms litre and millilitre, the student will recognize and use the appropriate measurement units and symbols. Students will select, use, and read appropriate measuring instrument for capacity (millilitre spoons or litre cup).

AUDIO TAPELEARNING ACTIVITIES

After completing Section D, the student will be able to. . .

- | | |
|---|--|
| 1. Read the words <u>millilitre</u> and <u>litre</u> and the symbols <u>ml</u> and <u>l</u> . | 1. Estimate the capacity of containers in litres to within 25% of the actual capacity. |
| 2. Recognize the written words <u>liquid</u> , <u>litre cup</u> , <u>2 millilitre spoon</u> , and <u>5 millilitre spoon</u> . | 2. Read the measurements on a litre cup and millilitre spoons correctly. |
| 3. Select a litre cup as the appropriate measuring instrument when asked to find the capacity of large containers or amounts. | 3. Measure the capacity of containers in litres to within 10% of the actual capacity. |
| 4. Select a set of millilitre spoons as the appropriate instruments when asked to find the capacity of small amounts. | 4. Measure the correct amount in litres or millilitres needed for a recipe. |
| | 5. Write litre quantities using the symbol <u>l</u> and millilitre quantities using the symbol <u>ml</u> . |

OBJECTIVE:

For the term degree Celsius, the student will recognize and use the appropriate measurement unit and symbol. Students will select, use, and read the appropriate measuring instrument (clinical or nonclinical Celsius thermometer).

AUDIO TAPELEARNING ACTIVITIES

After completing Section E. the student will be able to. . .

- | | |
|---|---|
| 1. Read the words <u>degree Celsius</u> and the symbol <u>°C</u> . | 1. Estimate the temperature of a room, of the outdoors, or of a container of liquid to within 25% of the actual temperature. |
| 2. Recognize the written words <u>Celsius</u> , <u>hot</u> , <u>cold</u> , <u>Celsius thermometer</u> , and <u>Celsius clinical thermometer</u> . | 2. Read a Celsius thermometer and a clinical Celsius thermometer correctly. |
| 3. Select a Celsius thermometer as the appropriate measuring instrument when asked to find the temperature of something. | 3. Measure the temperature of the air (in a room or outdoors) and of a liquid in degrees Celsius to within 10% of their actual temperature. |
| | 4. Measure the temperature of a person with an oral clinical Celsius thermometer to within 1% of the person's actual temperature. |

APPENDIX VII-B

Objectives
ABE Metric Instructional Materials
Level II



OBJECTIVES

The student will demonstrate the listed skills for each of the five measurement groups, using the terms and devices shown. Page numbers refer to pages in the STUDENT WORKBOOK.

SKILLS	MEASUREMENT GROUPS				
	Linear	Area	Mass	Capacity	Temperature
	(pp. 4-22)	(pp. 23-29)	(pp. 30-39)	(pp. 40-53)	(pp. 54-59)
1. Recognize and use the unit and its symbol	millimetre (mm)	square centimetre (cm ²)	gram (g)	litre (l)	degree Celsius (°C)
2. State or show a physical reference for	centimetre (cm)		kilogram (kg)	millilitre (ml)	
	metre (m)	square metre (m ²)			
	kilometre (km)				
3. Read correctly	metre stick, metric tape measure, and metric rulers		a kilogram scale, gram scale	measurements on litre cups and millilitre spoons	Celsius thermometer, Celsius clinical thermometer
4. Calculate or determine (includes selecting and using any appropriate measuring instruments)	height, width, or length of objects	the area of a given space	the mass of objects	capacity of containers	the temperature of the air, a liquid, or a person
5. Estimate within 25% of the actual measure					
6. Convert a metric quantity in one of these units to its equivalent in another of these units			gram kilogram	litre millilitre	

APPENDIX VII-C

Objectives
ABE Metric Instructional Materials
Level III



OBJECTIVES

The student will demonstrate the listed skills for each of the five measurement groups, using the terms and devices shown. Page numbers refer to pages in the STUDENT WORKBOOK.

SKILLS	MEASUREMENT GROUPS				
	Linear (pp. 2-23)	Area (pp. 24-29)	Volume and Capacity (pp. 30-46)	Mass (pp. 47-55)	Temperature (pp. 56-58)
1. Recognize and use the unit and its symbol	millimetre (mm)	square centimetre (cm ²)	cubic centimetre (cm ³)	gram (g)	degree Celsius (°C)
2. State or show a physical reference for	centimetre (cm)	square metre (m ²)	cubic metre (m ³)	kilogram (kg)	
	metre (m)		litre (l)		
	kilometre (km)		millilitre (ml)		
3. Read correctly	metre stick, metric tape measure, and metric rulers		measurements on litre cups and millilitre spoons	a kilogram scale, gram scale	Celsius thermometer, Celsius clinical thermometer
4. Calculate or determine (includes selecting and using any appropriate measuring instruments)	height, width, or length of objects	the area of a given space	capacity of containers and volume of objects	the mass of objects	the temperature of the air, a liquid, or a person
5. Estimate within 25% of the actual measure					
6. Convert a metric quantity in one of these units to its equivalent in another of these units	millimetre, centimetre, metre, kilometre		litre, millilitre	gram, kilogram	

APPENDIX VII-D

Evaluation Instrument
Sent to
ABE Advisory Committee Members

The purpose of these items is to obtain your reactions to several issues and concerns related to these ABE materials. Please indicate your response to each item either by filling in the blanks or by circling the letter in front of the option provided which best expresses your feelings. You are also encouraged to make any comments that will help us improve these materials in the spaces provided. If additional room is needed, feel free to write on the back of the booklet or on another sheet of paper.

1. Overall, how would you rate the quality of this material?

A. Excellent
B. Very Good
C. Good
D. Average
E. Poor

COMMENTS:

2. The STUDENT WORKBOOK was clearly written and complete.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

3. The Instructor's Guide was clearly written and complete.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

4. Generally speaking, the STUDENT WORKBOOK was written at an appropriate level for most of my students.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

5. The material in the STUDENT WORKBOOK corresponded with the OBJECTIVES that were given in the Instructor's Guide.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

6. Overall, how would you rate the metric information in THE INSTRUCTOR NEEDS TO KNOW section of the Instructor's Guide?

A. Excellent
B. Very good
C. Good
D. Average
E. Poor

COMMENTS:

7. The COMMENTS in the Instructor's Guide were clearly written and helped me conduct the Activities.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

8. The lists of MATERIALS NEEDED for each activity in the Instructor's Guide were clearly written and complete.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

9. The RESOURCES section of the Instructor's Guide was very helpful.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

10. The RESOURCES section of the Instructor's Guide should have included more on the following: _____
- _____
- _____

11. In the spaces below, describe the two things you liked MOST about the STUDENT WORKBOOK.

(A) First

(B) Second

12. In the spaces below, describe the two things you liked LEAST about the STUDENT WORKBOOK.

(A) First

(B) Second

13. In the spaces below, describe the two things you liked MOST about the Instructor's Guide.

(A) First

(B) Second

14. In the spaces below, describe the two things you liked LEAST about the Instructor's Guide.

(A) First

(B) Second

15. In the spaces below, describe the two things you liked MOST about the audio tape script. (LEVEL I only)

(A) First

(B) Second

16. In the spaces below, describe the two things you liked LEAST about the audio tapes and the audio tape script. (LEVEL I only)

(A) First

(B) Second

APPENDIX VII-E

Evaluation Instrument
Used by
ABE Field-test Instructors

INSTRUCTOR'S QUESTIONNAIRE
for
ADULT BASIC EDUCATION MATERIALS

Introduction

The basic purpose of the evaluation, of which this questionnaire is a part, is to obtain your professional opinions regarding the quality of the Adult Basic Education "Metrics for Good Measure" materials. More specifically, the intent is to get your reactions, *both good and bad*, concerning the materials and activities.

Your participation in the evaluation of these new instructional materials is very important. *You* are the *sole* source of information regarding these materials with your students. Also, your class is one of only a very few groups that are involved in the total evaluation effort.

Before you begin filling out this questionnaire, there are several points which you should remember. FIRST, YOUR PARTICIPATION IN THIS EVALUATION IS VOLUNTARY AND THERE IS NO PENALTY FOR NON-PARTICIPATION. Second, you are encouraged *not* to respond to any item about which you feel reluctant.

400

THE CENTER FOR VOCATIONAL EDUCATION

The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

The purpose of these items is to obtain your reactions to several issues and concerns related to these ABE materials. Please indicate your response to each item either by filling in the blanks or by circling the letter in front of the option provided which best expresses your feelings. You are also encouraged to make any comments that will help us improve these materials in the spaces provided. If additional room is needed, feel free to write on the back of the booklet or on another sheet of paper.

1. The materials you taught were Level _____.
2. Were you prepared to teach the materials?
 - A. Yes, even before the related in-service training.
 - B. Yes, after receiving the in-service training.
 - C. No, I was not as prepared as I would have liked.
 - D. No, I was uncomfortable teaching the package.
3. About how many *total* hours to actual classtime did you spend covering these materials? (_____ hours).
4. On the average, how long was each session during which you used the materials? (_____ hours).
5. Did you use the materials exactly in the order in which they are organized?
 - A. Yes
 - B. No (Please explain the changes you made!) _____

6. Was the reading level of the STUDENT WORKBOOK appropriate for your students?
 - A. Yes
 - B. Too high
 - C. Too low
7. What changes would you make in the reading level of the STUDENT WORKBOOK?

8. Was the mathematical level of the STUDENT WORKBOOK appropriate for your students?

- A. Yes
- B. Too high
- C. Too low

9. What changes would you make in the mathematics material in the STUDENT WORKBOOK?

10. Are there any students for whom you could *not* recommend the use of these materials?

- A. No
- B. Yes (Please describe the types of students!)

11. How appropriate were the materials for your course?

- A. Very appropriate
- B. Somewhat appropriate
- C. Very inappropriate

COMMENTS:

12. Would you use this Adult Basic Education material again?

- A. Yes, without any changes being made in it.
- B. Yes, but only if a few important changes are made in it.
- C. Yes, but only if major changes are made in it.
- D. No

COMMENTS:

13. Would you recommend this ABE material to other teachers?

- A. Yes, quite strongly
- B. Yes, somewhat
- C. Yes, but not very strongly
- D. No

14. Overall, how would you rate the quality of this material?

- A. Excellent
- B. Very Good
- C. Good
- D. Average
- E. Poor

COMMENTS:

15. The STUDENT WORKBOOK was clearly written and complete.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

16. The Instructor's Guide was clearly written and complete.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

17. In Level I, the speaker on the cassette tape spoke

- A. Too fast
- B. The right speed
- C. Too slow

COMMENTS:

18. In Level I, the cassette tapes were

- A. Easy to hear and easy to understand
- B. Easy to hear but hard to understand
- C. Hard to hear but easy to understand
- D. Hard to hear and understand

COMMENTS:

19. Generally speaking, the STUDENT WORKBOOK was written at an appropriate level for most of my students.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

20. Teaching the materials in this package took up too much time.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

21. The organization and format of the materials facilitated the instructional process and made it easier.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

22. As we were going through these materials, I found that the students had difficulty "thinking matric."

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

23. I feel this package will fit very well into my regular instructional program.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

24. The material in the STUDENT WORKBOOK corresponded with the OBJECTIVES that were given in the Instructor's Guide.

- A. Strongly agree
- B. Agree
- C. No opinion
- D. Disagree
- E. Strongly disagree

COMMENTS:

25. Overall, how would you rate the metric information in THE INSTRUCTOR NEEDS TO KNOW section of the Instructor's Guide?

A. Excellent
B. Very good
C. Good
D. Average
E. Poor

COMMENTS:

26. The COMMENTS in the Instructor's Guide were clearly written and helped me conduct the Activities.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

27. The lists of MATERIALS NEEDED for each activity in the Instructor's Guide were clearly written and complete.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

28. The RESOURCES section of the Instructor's Guide was very helpful.

A. Strongly agree
B. Agree
C. No opinion
D. Disagree
E. Strongly disagree

COMMENTS:

29. The RESOURCES section of the Instructor's Guide should have included more on the following: _____

30. In the spaces below, describe the two things you liked MOST about the STUDENT WORKBOOK.

(A) First

(B) Second

31. In the spaces below, describe the two things you liked LEAST about the STUDENT WORKBOOK.

(A) First

(B) Second

32. In the spaces below, describe the two things you liked MOST about the Instructor's Guide.

(A) First

(B) Second

33. In the spaces below, describe the two things you liked LEAST about the Instructor's Guide.

(A) First

(B) Second

34. In the spaces below, describe the two things you liked MOST about the audio tape script. (LEVEL I only)

(A) First

(B) Second

35. In the spaces below, describe the two things you liked LEAST about the audio tapes and the audio tape script. (LEVEL I only)

(A) First

(B) Second

Please write any suggested changes in one copy of the STUDENT WORKBOOK and in your Instructor's Guide. Make sure you return those edited copies with this questionnaire. (Level I instructors may also want to put any appropriate suggestions on the audio tape script.)

APPENDIX VII-F

Script for Student Evaluation Booklet
ABE, Level I

SCRIPT
STUDENT POSTTEST BOOKLET

for
METRICS FOR GOOD MEASURE
LEVEL I



LEVEL I

POSTTEST

PAUSE

Open the test booklet to page 1.

PAUSE

There are four rows of pictures on this page. Each row has three pictures. Look at Row A. It has pictures of an automobile, a paper clip, and an ice cube. Which would you measure with a metre stick? Circle the correct picture.

PAUSE

Did you circle the picture of the automobile? You would measure an automobile with a metre stick. Both a paper clip and an ice cube are too small to measure with a metre stick.

PAUSE

Look at Row B. It has pictures of a hammer, a person in bed, and a telephone. Which of these would you measure with a Celsius thermometer? Circle the correct picture in Row B.

PAUSE

You would measure a person's temperature with a Celsius thermometer so you should have circled the picture of the person in bed. Neither a hammer nor a telephone is measured with a Celsius thermometer.

PAUSE

Look at Rows 1 through 10. For each row I will mention a metric measurement term. Circle the picture of the object you would measure using that term. I will not give the answers for the rest of these rows.

PAUSE

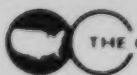
Row 1 has pictures of a woman, a pencil, and a fried egg. Which of these would you measure with a kilogram scale? Circle the correct picture.

PAUSE

Row 2 has pictures of a window, a brick, and a can of gasoline. Which would you measure in litres? Circle the correct picture.

PAUSE

Turn to page 2.



PAUSE

Row 3 has pictures of a book, a screwdriver, and a bottle of vanilla. Which would you measure in millilitres? Circle the correct picture.

PAUSE

Row 4 has pictures of a toothbrush, a truck, and a water fountain. Which of these would you measure in centimetres? Circle the correct picture.

PAUSE

Row 5 has pictures of a television set, a piece of Swiss cheese, and a mattress. Which of these would you measure with a gram scale? Circle the correct picture.

PAUSE

Row 6 has pictures of a cold day, a chair, and an automobile tire. One of the items would be measured with a Celsius thermometer. Circle the correct picture.

PAUSE

Turn to page 3.

PAUSE

Row 7 has pictures of a carton of milk, a boy, and a picture frame. Which would you measure in litres? Circle the correct picture.

PAUSE

Row 8 has pictures of a hot cup of coffee, a lollipop, and a sofa. Which would you measure with a metre stick? Circle the correct picture.

PAUSE

Row 9 has pictures of a pair of sunglasses, a sack of potatoes, and a letter. Which of these objects would you measure with a kilogram scale? Circle the correct picture.

PAUSE

Row 10 has pictures of an elephant, a nail, and a school building. Which would you measure with a centimetre ruler? Circle the correct picture.

PAUSE

Turn to page 4.

PAUSE

There are eight pictures on page 4. Beside each picture is a letter or a number. C is a picture of salt being poured from a box; D is a picture of a bowl of hot soup; 11 is a picture of a large dog; 12 is a picture of a fire; 13 is a glass of orange juice; 14 is a pair of scissors, 15 shows several pieces of candy, and 16 is a picture of a book.

PAUSE

In the center of the page are five measurement words--millilitre, kilogram, degree Celsius, centimetre, and gram.

PAUSE

Draw a line from Picture C, the salt being poured from a box, to the measurement word which tells how it can best be measured. Which measurement word would you use to put the right amount of salt in a recipe?

PAUSE

Did you draw a line to the word "millilitre"? You should have, because you would measure the amount of salt in millilitres.

PAUSE

Now draw a line from Picture D, the bowl of hot soup, to the measurement word which tells how hot the soup is.

PAUSE

You should have drawn a line from Picture D to the third measurement term on the page--degree Celsius.

PAUSE

For the rest of the pictures on this page you should draw a line from the picture to a measurement word. I will not give you the answers to the rest of these.

PAUSE

Look at picture 11. This is a picture of a large dog. Draw a line from the picture of the large dog to the word that tells how heavy the dog is.



PAUSE

12 is a picture of a fire. We want to know how hot the fire is. Draw a line from Picture 12 to the measurement word which best tells how hot the fire is.

PAUSE

Picture 13 is a glass of orange juice. If we wanted to know how much juice is in that glass, which measurement term would we use? Draw a line from Picture 13 to the correct term.

PAUSE

A pair of scissors is shown in Picture 14. Which measurement term would be used to tell how long these scissors are? Draw a line from the picture of the scissors to the correct measurement word.

PAUSE

Several pieces of candy are shown in Picture 15. If we wanted to tell how heavy these pieces of candy are what measurement term would we use? Draw a line from Picture 15 to the correct measurement term.

PAUSE

The last picture of the page is Picture 16--a book. Which measurement term would you use to tell how long the book is? Draw a line from Picture 16 to the correct word.

PAUSE

Turn to page 5.

PAUSE

There are six pictures on Page 5. Beside each picture is a number. Picture 17 is a small package, Picture 18 a bicycle, Picture 19 a can of paint, Picture 20 is a doorway, Picture 21 a bathtub full of water, and Picture 22 shows several thumbtacks.

PAUSE

In the center of the page are four measurement terms--metre, litre, gram, and degree Celsius.

PAUSE

Picture 17 is of a small package. If we wanted to know how much this package weighed which measurement term would we use? Draw a line from Picture 17 to the measurement term which best tells how much the package weighs.

PAUSE

In Picture 18 there is a bicycle. If you wanted to tell someone how long the bicycle is which measurement term would you use? Draw a line from Picture 18 to the correct term.

PAUSE

A can of paint is shown in Picture 19. Which measurement term would be used to tell how much paint is in the can? Draw a line from the picture of the can of paint to the correct measurement word.

PAUSE

Picture 20 is of a doorway. You want to know how high this doorway is. What measurement term would you use? Draw a line from Picture 20 to the measurement term you picked.

PAUSE

A bathtub full of water is shown in Picture 21. If you want to know how warm the water is which measurement term would you use? Draw a line from Picture 21 to the correct term.

PAUSE

Picture 22 shows several thumbtacks. You want to know how heavy all of these thumbtacks are. Which measurement term would you use? Draw a line from Picture 22 to the term you picked.

PAUSE

Turn to page 6.

PAUSE

On the left side of page 6 are six measurement terms. Each term has a letter or number. Term E is gram; term 23, metre; term 24 is millilitre; term 25 is degree Celsius; term 26 centimetre; and term 27 is kilogram.

PAUSE

On the right side of the page are seven symbols for the measurement terms.

PAUSE

Look at the measurement term called E. Draw a line from this measurement term--gram--to the symbol for the measurement term.

PAUSE

You should have drawn a line from gram to the symbol g.

PAUSE

Now draw a line from each of the other measurement terms to the symbol that is used to represent that term.

PAUSE

Close the booklet. Thank you very much for your help. Please hand your booklet to the instructor.



STUDENT POSTTEST BOOKLET

for

METRICS FOR GOOD MEASURE

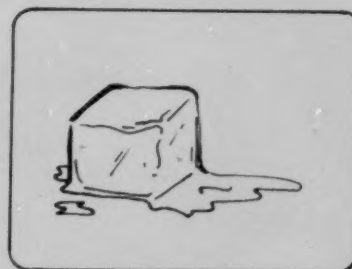
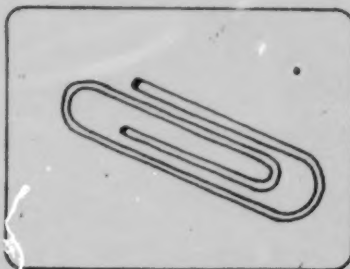
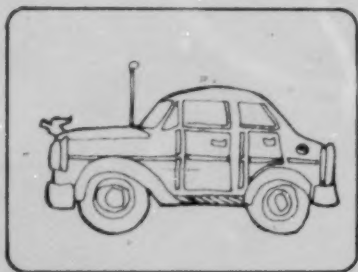
LEVEL I

416



THE CENTER FOR VOCATIONAL EDUCATION

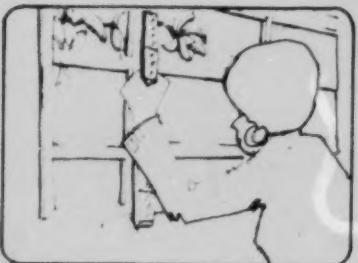
A



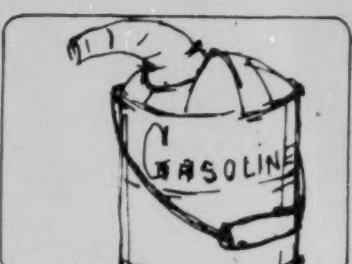
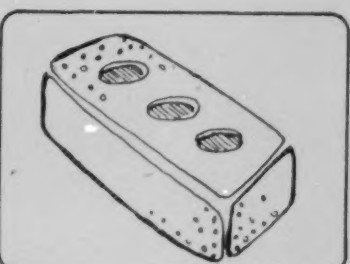
B



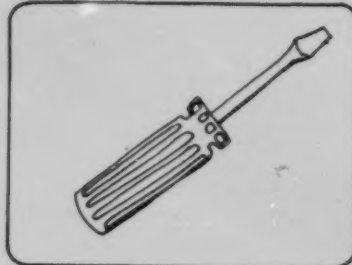
1



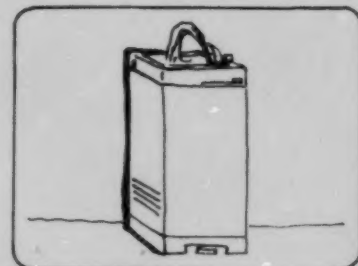
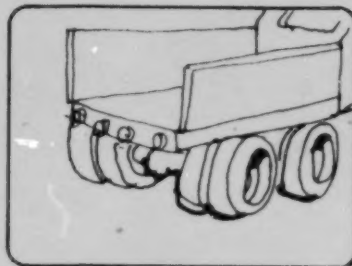
2



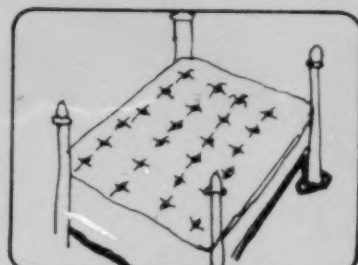
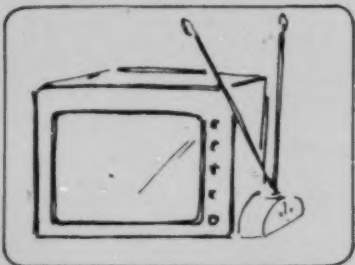
3



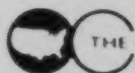
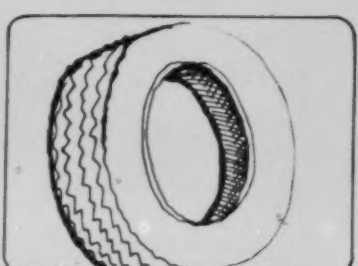
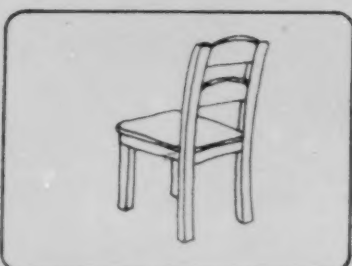
4



5



6



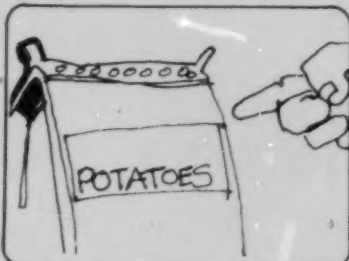
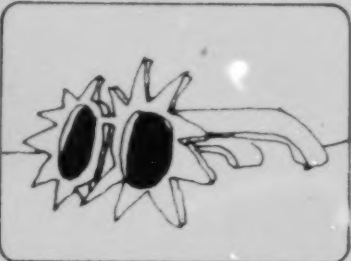
7



8

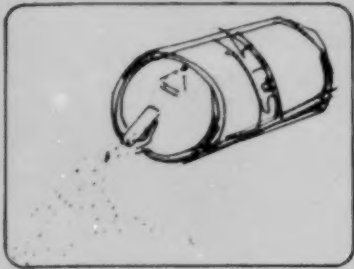


9



10



C

millilitre

13**D**

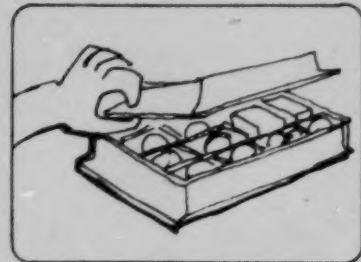
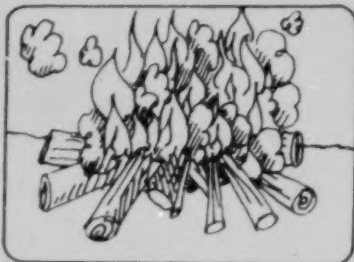
kilogram

14

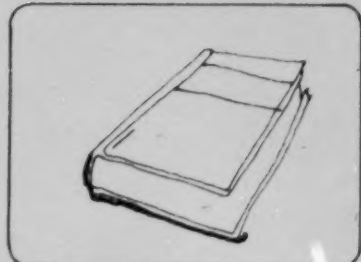
degree Celsius

11

centimetre

15**12**

gram

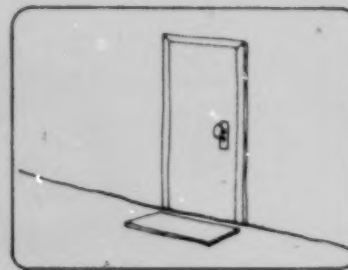
16

17



metre

20

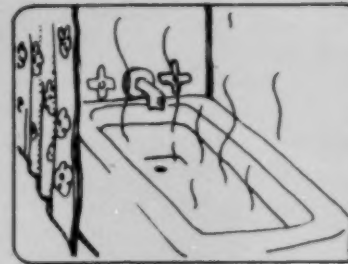


litre

18

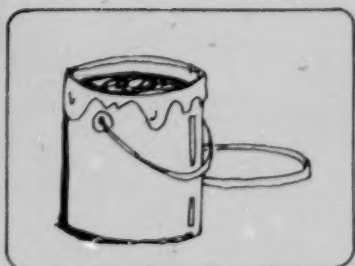


21



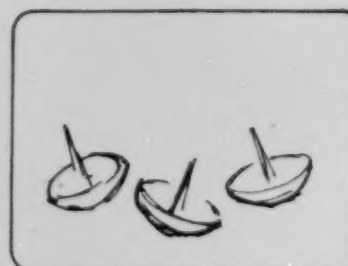
gram

19



degree Celsius

22



E gram

g

23 metre

°C

24 millilitre

ml

25 degree Celsius

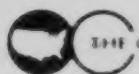
m

26 centimetre

kg

27 kilogram

cm



ANSWERS

to

STUDENT POSTTEST

LEVEL I

- | | | |
|------|--------------------|--------------------|
| 1. 1 | 10. 2 | 19. litre |
| 2. 3 | 11. kilogram | 20. metre |
| 3. 3 | 12. degree Celsius | 21. degree Celsius |
| 4. 1 | 13. millilitre | 22. gram |
| 5. 2 | 14. centimetre | 23. m |
| 6. 1 | 15. gram | 24. ml |
| 7. 1 | 16. centimetre | 25. °C |
| 8. 3 | 17. gram | 26. cm |
| 9. 2 | 18. metre | 27. kg |



APPENDIX VII-G

Student Test Booklet
ABE, Levels II and III

399
STUDENT TEST BOOKLET

for

ADULT BASIC EDUCATION
LEVEL II

Introduction

The metric program you have just finished was designed just for you. Your answers to the test items will tell us if we did a good job or not. Therefore, please answer all the questions as best you can. Your answers will help us improve the materials if they need it.

However, you do NOT have to take this test if you don't want to. Also, you do not have to answer any questions you don't want to.

Directions

This test has 25 questions. Read each question carefully. There are three kinds of questions on this test.

One type of question is a multiple-choice question. Read each of the possible answers below the question. Pick the number of the answer you think is best. Write the number of this answer in the blank in the question.

Example:

0. There are (3) metres in one kilometre.

- (1) 10
- (2) 100
- (3) 1 000
- (4) 10 000

There are 1 000 metres in one kilometre. The correct answer is number 3. So, the number 3 is written in the blank.

A second type of question asks you to fill in the blank. You are to put what you think is the correct answer in the blank.

The third type of question also asks you to fill in the blank. But, before you fill in the blank you have to measure an object that is on the resource table. Each object on the resource table has been given a letter. Make sure you measure the correct object. If you do not see it someone else may be measuring it. Please wait until they are through; then measure the object and write your answer in the blank.

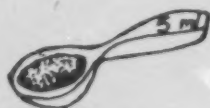
1. A millimetre is about the size of _____.

- (1) the thickness of a paper clip wire.
- (2) the top of a card table.
- (3) a bathroom scale.
- (4) the length of your little finger.

2. A box has a mass of 57 kilograms. Using metric symbols, this can also be written as 57 _____.

3. Measure the length of the resource table. It is _____ metres long.

4. How much salt is in this spoon? _____.



5. A measure that is the same as 43 litres is _____.

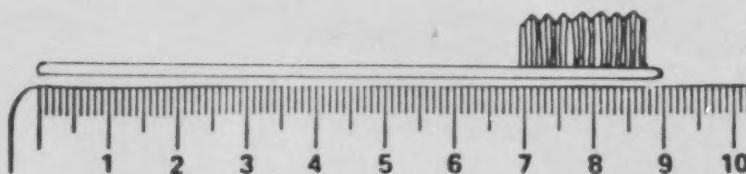
- (1) 0.043 ml
- (2) 4 300 ml
- (3) 43 000 ml
- (4) 0.43 ml

6. The distance between New York City and Boston is about 369 kilometres. If you write this using the symbol for kilometres you would write 369 _____.

7. The temperature shown on this thermometer is _____.



8. This toothbrush is _____ cm long.



9. On the resource table is block D. ESTIMATE its mass in kilograms. _____ kg.

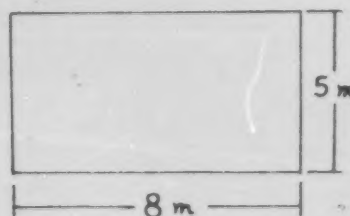
10. On the resource table is a red cardboard square, B. ESTIMATE the length of one side of this square in centimetres. _____ cm

11. If you use the symbol for millilitres, 28 millilitres can be written as 28 _____.

12. This needle is _____ mm long.



13. The area of this rectangle is _____ m²



14. On the resource table is a ball, K. Its mass is _____.

15. If you use metric symbols, 47 millimetres can also be written as 47 _____.

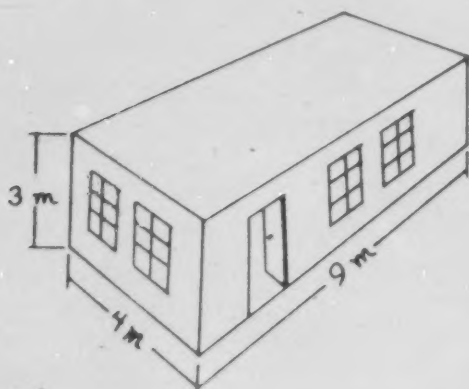
16. The temperature shown on this thermometer is _____ °C.



17. Using metric symbols, 273 square metres can also be written as 273 _____.

18. On the resource table is a can, G. Measure its capacity. It is _____ millilitres.

19. The area of the floor of the house in this picture is _____.

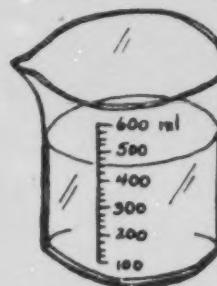


20. A measure that is the same as 934 kilograms is _____.

- (1) 0.934 g
- (2) 934 000 g
- (3) 9.34 g
- (4) 93 400 g

21. On the resource table is a can, C. ESTIMATE how many litres can C will hold. _____

22. How much water is in this cup? _____ ml



23. A square metre is about the size of _____.

- (1) a card table top.
- (2) your thumbnail.
- (3) the floor of the classroom.
- (4) a 25¢ coin (quarter).

24. A metre is about _____.

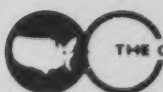
- (1) the distance you can walk in 12 minutes
- (2) the width of a brick.
- (3) the height of the ceiling of this room.
- (4) the height of a doorknob from the floor.

25. Measure the temperature of the liquid in can N. It is _____.

ABE
LEVEL II

DO NOT WRITE BELOW THIS LINE

- 1) -----
- 2) ---
- 3) ---
- 4) ---
- 5) ---
- 6) ---



THE CENTER FOR VOCATIONAL EDUCATION

403
STUDENT TEST BOOKLET

for
ADULT BASIC EDUCATION
LEVEL II

Introduction

The metric program you have just finished was designed just for you. Your answers to the test items will tell us if we did a good job or not. Therefore, please answer all the questions as best you can. Your answers will help us improve the materials if they need it.

However, you do NOT have to take this test if you don't want to. Also, you do not have to answer any questions you don't want to.

Directions

This test has 25 questions. Read each question carefully. There are three kinds of questions on this test.

One type of question is a multiple-choice question. Read each of the possible answers below the question. Pick the number of the answer you think is best. Write the number of this answer in the blank in the question.

Example:

0. There are (3) metres in one kilometre.

- (1) 10
- (2) 100
- (3) 1 000
- (4) 10 000

There are 1 000 metres in one kilometre. The correct answer is number 3. So, the number 3 is written in the blank.

A second type of question asks you to fill in the blank. You are to put what you think is the correct answer in the blank.

The third type of question also asks you to fill in the blank. But, before you fill in the blank you have to measure an object that is on the resource table. Each object on the resource table has been given a letter. Make sure you measure the correct object. If you do not see it someone else may be measuring it. Please wait until they are through; then measure the object and write your answer in the blank.

1. A centimetre is about _____.

- (1) the width of a fingernail
- (2) the thickness of a dime.
- (3) the capacity of a spoon.
- (4) the length of this room.

2. A rock has a mass of 128 grams. Using metric symbols, this can also be written as 128 _____.

3. On the resource table is a block A. Measure the length of this block. It is _____ millimetres long.

4. How much salt is in this spoon? _____

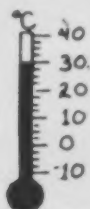


5. A measure that is the same as 52 ml is _____.

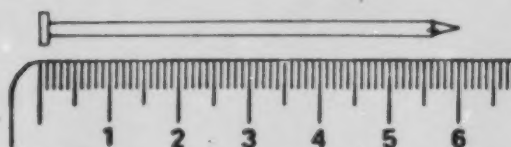
- (1) 52 000 litres
- (2) 5 200 litres
- (3) 0.052 litre
- (4) 0.52 litre

6. The distance between New York City and Boston is about 369 kilometres. If you write this using the symbol for kilometres you would write 369 _____.

7. The temperature shown on this thermometer is _____.



8. This nail is _____ cm long.

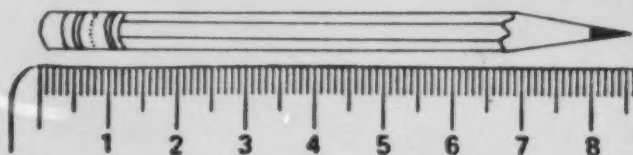


9. On the resource table is a box, H. ESTIMATE its mass in grams. _____ g.

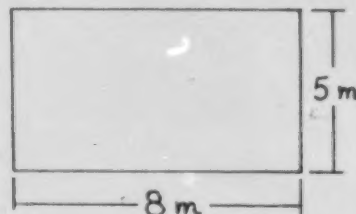
10. On the resource table is a yellow cardboard square, M. ESTIMATE the length of one side of this square in millimetres. _____ mm

11. If you use the symbol for millilitres, 28 millilitres can be written as 28 _____.

12. This pencil is _____ mm long.



13. The area of this rectangle is _____ m².



14. On the resource table is a brick, J. Its mass is _____.

15. If you use metric symbols, 47 millimetres can also be written as 47 _____.

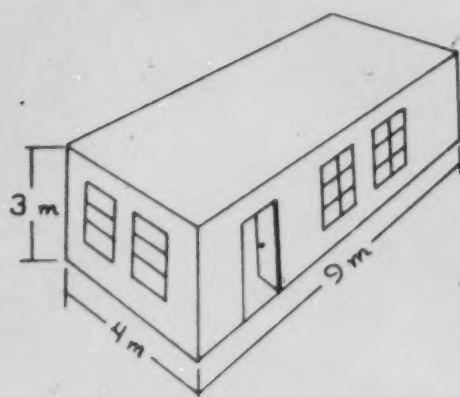
16. The temperature shown on this thermometer is _____ °C.



17. Using metric symbols, 48 square metres can also be written as 48 _____.

18. On the resource table is a can, F. Measure its capacity. It is _____ litres.

19. The area of the floor of the house in this picture is _____.

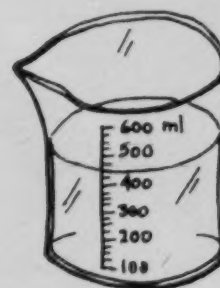


20. A measure that is the same as 187 grams is _____.

- (1) 187 000 kg
- (2) 0.187 kg
- (3) 1.87 kg
- (4) 18 700 kg

21. On the resource table is a can, P. ESTIMATE how many litres it holds. _____

22. How much water is in this cup? _____ ml



23. A square metre is about the size of _____.

- (1) a card table top.
- (2) your thumbnail.
- (3) the floor of the classroom.
- (4) a 25¢ coin (quarter).

24. A metre is about _____.

- (1) the distance you can walk in 12 minutes.
- (2) the width of a brick.
- (3) the height of the ceiling of this room.
- (4) the height of a doorknob from the floor.

25. Measure the temperature of this room. It is _____.

ABE
LEVEL II

----- DO NOT WRITE BELOW THIS LINE -----

- 1) -----
- 2) -----
- 3) -----
- 4) -----
- 5) -----
- 6) -----



407
STUDENT TEST BOOKLET

for
ADULT BASIC EDUCATION
LEVEL III

Introduction

The metric program you have just finished was designed just for you. Your answers to the test items will tell us if we did a good job or not. Therefore, please answer all the questions as best you can. Your answers will help us improve the materials if they need it.

However, you do NOT have to take this test if you don't want to. Also, you do not have to answer any questions you don't want to.

Directions

This test has 30 questions. Read each question carefully. There are three kinds of questions on this test.

One type of question is a multiple-choice question. Read each of the possible answers below the question. Pick the number of the answer you think is best. Write the number of this answer in the blank in the question.

Example:

0. There are (3) metres in one kilometre.

- (1) 10
- (2) 100
- (3) 1 000
- (4) 10 000

There are 1 000 metres in one kilometre. The correct answer is number 3. So, the number 3 is written in the blank.

A second type of question asks you to fill in the blank. You are to put what you think is the correct answer in the blank.

The third type of question also asks you to fill in the blank. But, before you fill in the blank you have to measure an object that is on the resource table. Each object on the resource table has been given a letter. Make sure you measure the correct object. If you do not see it someone else may be measuring it. Please wait until they are through; then measure the object and write your answer in the blank.

1. A millimetre is about the size of _____.

- (1) the thickness of a paper clip wire.
- (2) the top of a card table.
- (3) a bathroom scale.
- (4) the length of your little finger.

2. A box has a mass of 57 kilograms. Using metric symbols, this can also be written as 57 _____.

3. Measure the length of the resource table. It is _____ metres long.

4. How much salt is in this spoon? _____.



5. A measure that is the same as 43 litres is _____.

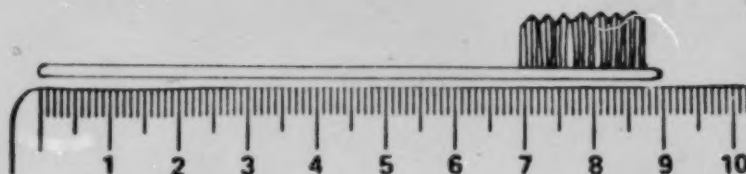
- (1) 0.043 ml
- (2) 4 300 ml
- (3) 43 000 ml
- (4) 0.43 ml

6. The distance between New York City and Boston is about 369 kilometres. If you write this using the symbol for kilometres you would write 369 _____.

7. The temperature shown on this thermometer is _____.



8. This toothbrush is _____ cm long.



9. On the resource table is block D. ESTIMATE its mass in kilograms. _____ kg.

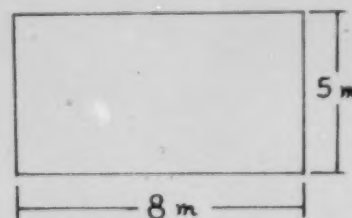
10. On the resource table is a red cardboard square, B. ESTIMATE the length of one side of this square in centimetres. _____ cm

11. If you use the symbol for millilitres, 28 millilitres can be written as 28 _____.

12. This needle is _____ mm long.



13. The area of this rectangle is _____ m²



14. On the resource table is a ball, K. Its mass is _____.

15. If you use metric symbols, 47 millimetres can also be written as 47 _____.

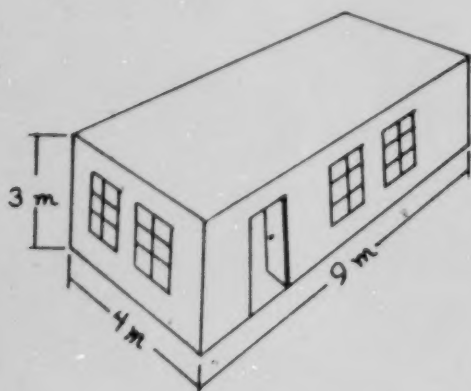
16. The temperature shown on this thermometer is _____ °C.



17. Using metric symbols, 273 square metres can also be written as 273 _____.

18. On the resource table is a can, G. Measure its capacity. It is _____ millilitres.

19. The area of the floor of the house in this picture is _____.

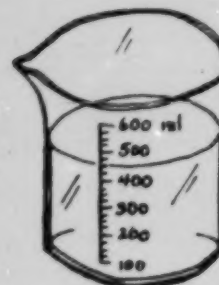


20. A measure that is the same as 934 kilograms is _____.

- (1) 0.934 g
- (2) 934 000 g
- (3) 9.34 g
- (4) 93 400 g

21. On the resource table is a can, C. ESTIMATE how many litres can C will hold. _____

22. How much water is in this cup? _____ ml



23. A square metre is about the size of _____.

- (1) a card table top.
- (2) your thumbnail.
- (3) the floor of the classroom.
- (4) a 25¢ coin (quarter).

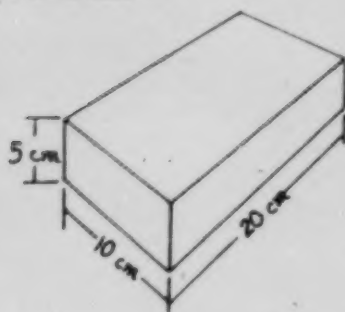
24. A metre is about _____.

- (1) the distance you can walk in 12 minutes
- (2) the width of a brick.
- (3) the height of the ceiling of this room.
- (4) the height of a doorknob from the floor.

25. Measure the temperature of the liquid in can N. It is _____.

ABE
LEVEL III

26. The volume of this box is _____ cm^3 .



27. A measure that is the same as 0.8 cm is _____.

- (1) 8 mm
- (2) 80 m
- (3) 0.08 mm
- (4) 8 m

28. If you use metric symbols, 13 cubic metres can also be written as 13 _____.

29. A measure that is the same as 5 000 mm is _____.

- (1) 5 cm
- (2) 50 m
- (3) 500 cm
- (4) 50 000 cm

30. On the resource table is a rock labeled E. Measure its volume. Its volume is _____ cm^3 .

DO NOT WRITE BELOW THIS LINE

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____



STUDENT TEST BOOKLET

for

ADULT BASIC EDUCATION
LEVEL IIIIntroduction

The metric program you have just finished was designed just for you. Your answers to the test items will tell us if we did a good job or not. Therefore, please answer all the questions as best you can. Your answers will help us improve the materials if they need it.

However, you do NOT have to take this test if you don't want to. Also, you do not have to answer any questions you don't want to.

Directions

This test has 30 questions. Read each question carefully. There are three kinds of questions on this test.

One type of question is a multiple-choice question. Read each of the possible answers below the question. Pick the number of the answer you think is best. Write the number of this answer in the blank in the question.

Example:

0. There are (3) metres in one kilometre.

- (1) 10
- (2) 100
- (3) 1 000
- (4) 10 000

There are 1 000 metres in one kilometre. The correct answer is number 3. So, the number 3 is written in the blank.

A second type of question asks you to fill in the blank. You are to put what you think is the correct answer in the blank.

The third type of question also asks you to fill in the blank. But, before you fill in the blank you have to measure an object that is on the resource table. Each object on the resource table has been given a letter. Make sure you measure the correct object. If you do not see it someone else may be measuring it. Please wait until they are through; then measure the object and write your answer in the blank.

1. A centimetre is about _____.

- (1) the width of a fingernail
- (2) the thickness of a dime.
- (3) the capacity of a spoon.
- (4) the length of this room.

2. A rock has a mass of 128 grams. Using metric symbols, this can also be written as 128 _____.

3. On the resource table is a block A. Measure the length of this block. It is _____ millimetres long.

4. How much salt is in this spoon? _____

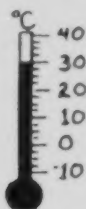


5. A measure that is the same as 52 ml is _____.

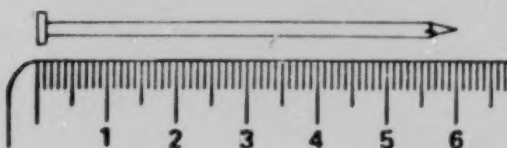
- (1) 52 000 litres
- (2) 5 200 litres
- (3) 0.052 litre
- (4) 0.52 litre

6. The distance between New York City and Boston is about 369 kilometres. If you write this using the symbol for kilometres you would write 369 _____.

7. The temperature shown on this thermometer is _____.



8. This nail is _____ cm long.



9. On the resource table is a box, H. ESTIMATE its mass in grams. _____ g.

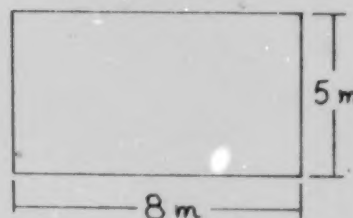
10. On the resource table is a yellow cardboard square, M. ESTIMATE the length of one side of this square in millimetres. _____ mm

11. If you use the symbol for millilitres, 28 millilitres can be written as 28 _____.

12. This pencil is _____ mm long.



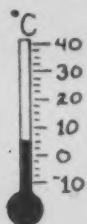
13. The area of this rectangle is _____ m².



14. On the resource table is a brick, J. Its mass is _____.

15. If you use metric symbols, 47 millimetres can also be written as 47 _____.

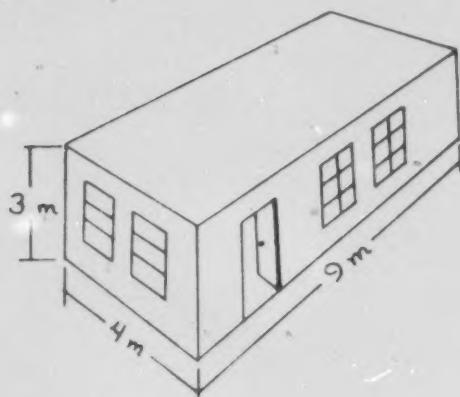
16. The temperature shown on this thermometer is _____ °C.



17. Using metric symbols, 48 square metres can also be written as 48 _____.

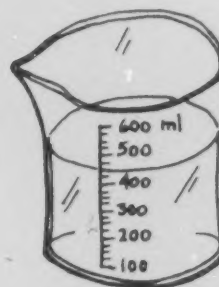
18. On the resource table is a can, F. Measure its capacity. It is _____ litres.

19. The area of the floor of the house in this picture is _____.



21. On the resource table is a can, P. ESTIMATE how many litres it holds. _____

22. How much water is in this cup? _____ ml



23. A square metre is about the size of _____.

- (1) a card table top.
- (2) your thumbnail.
- (3) the floor of the classroom.
- (4) a 25¢ coin (quarter).

24. A metre is about _____.

- (1) the distance you can walk in 12 minutes.
- (2) the width of a brick.
- (3) the height of the ceiling of this room.
- (4) the height of a doorknob from the floor.

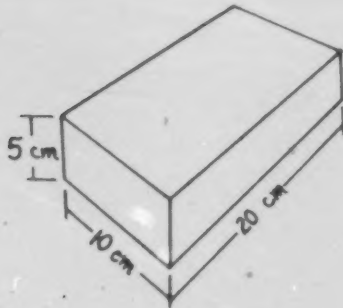
20. A measure that is the same as 187 grams is _____.

- (1) 187 000 kg
- (2) 0.187 kg
- (3) 1.87 kg
- (4) 18 700 kg

25. Measure the temperature of this room. It is _____.

ABE
LEVEL III

26. The volume of this box is _____ cm^3 .



27. A measure that is the same as 14 km is _____.

- (1) 14 000 m
- (2) 1.4 cm
- (3) 14 000 cm
- (4) 1 400 m

28. If you use metric symbols, 13 cubic metres can also be written as 13 _____.

29. A measure that is the same as 5 000 mm is _____.

- (1) 5 cm
- (2) 50 m
- (3) 500 cm
- (4) 50 000 cm

30. On the resource table is a block labeled L. Measure its volume. Its volume is _____ cm^3 .

DO NOT WRITE BELOW THIS LINE

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____



APPENDIX VII-H

Field Test Procedure
ABE Metric Instructional Materials

3) Ethnic background of student--1 Hispanic
2 American Indian or Alaskan Native
3 Asian or Pacific Islander
4 Negro, not of Hispanic origin
5 Caucasian, not of Hispanic origin

- 4) Reading level of student--Put approximate grade level at which the student is reading. For example, 01 for first grade reading level, 06 for sixth grade reading level, and 12 for twelfth grade reading level.
- 5) Mathematical level of student--Put approximate grade level of the student's mathematical development. Again use 01 for First grade level, etc.
- 6) Measurement skill of student--
 - 1 Poor
 - 2 Fair
 - 3 Good
 - 4 Very Good
 - 5 Excellent

2. Distribute the correctly numbered Test Booklets to each student.
3. Go over the Student Test Booklet Introduction with the students.
4. After students complete the evaluation, collect the Student Test Booklets.

E. COMPLETE AND MAIL THE POST-INSTRUCTION MATERIALS

1. Please complete the Instructors' Questionnaire.
2. Please write any appropriate comments and corrections in your copy of the Student Workbook, the Instructor's Guide, and (for Level I) the Audio Tape script.
3. Place the Student Test Booklets, Instructor's Questionnaire, and edited versions of the STUDENT WORKBOOK, Instructor's Guide, and Audio Tape Script, in the pre-paid envelope and MAIL.
4. Thank you very much for helping prepare better materials for our ABE students.

If you have any questions, please call the Metric Education Project 1-614-486-3655.

APPENDIX VII-I

Evaluation Results
From
ABE Advisory Committee

On December 20, 1976, a complete seven-book set of the field test versions of the Adult Basic Education materials for Level I, II, and III were mailed to each of the ten members of the Advisory Committee. Along with the books was an evaluation form for the materials and a request that the evaluation form be returned by January 7, 1977. Completed evaluation forms were received from four people. This is a summary of those four returns.

1. Overall, how would you rate the quality of this material?

- 1 - A. Excellent
- 3 - B. Very Good
- 0 - C. Good
- 0 - D. Average
- 0 - E. Poor

COMMENTS:

NONE

2. The STUDENT WORKBOOK was clearly written and complete.

- 2 - A. Strongly agree
- 2 - B. Agree
- 0 - C. No opinion
- 0 - D. Disagree
- 0 - E. Strongly disagree

NONE

3. The Instructor's Guide was clearly written and complete.

- 2 - A. Strongly agree
- 2 - B. Agree
- 0 - C. No opinion
- 0 - D. Disagree
- 0 - E. Strongly disagree

NONE

4. Generally speaking, the STUDENT WORKBOOK was written at an appropriate level for most of my students.

- 1 - A. Strongly agree
- 1 - B. Agree
- 2 - C. No opinion
- 0 - D. Disagree
- 0 - E. Strongly disagree

NONE

5. The material in the STUDENT WORKBOOK corresponded with the OBJECTIVES that were given in the Instructor's Guide.

0 - A. Strongly agree
 3 - B. Agree
 0 - C. No opinion
 0 - D. Disagree
 0 - E. Strongly disagree
 1 - No response

COMMENTS:

NONE

6. Overall, how would you rate the metric information in THE INSTRUCTOR NEEDS TO KNOW section of the Instructor's Guide?

2 - A. Excellent
 2 - B. Very good
 0 - C. Good
 0 - D. Average
 0 - E. Poor

See Below

COMMENTS:

If a teacher has no metre stick, how should one be made (measure x number of inches) or where (what kind of shops) should a teacher go to buy or order one?

Clear, concise drawings, especially for levels II and III, make concept clear.

7. The COMMENTS in the Instructor's Guide were clearly written and helped me conduct the Activities.

0 - A. Strongly agree
 4 - B. Agree
 0 - C. No opinion
 0 - D. Disagree
 0 - E. Strongly disagree

NONE

8. The lists of MATERIALS NEEDED for each activity in the Instructor's Guide were clearly written and complete.

1 - A. Strongly agree
 3 - B. Agree
 0 - C. No opinion
 0 - D. Disagree
 0 - E. Strongly disagree

See below

COMMENTS:

However, I feel some teachers will have problems in providing all the materials.

9. The RESOURCES section of the Instructor's Guide was very helpful.

- 1 - A. Strongly agree
 1.5 - B. Agree
 1.5 - C. No opinion
 0 - D. Disagree
 0 - E. Strongly disagree

COMMENTS:

NONE

10. The RESOURCES section of the Instructor's Guide should have included more on the following:

A separate booklet of resources (free and low cost) or list by subject: Linear Activities and Resources

11. In the spaces below, describe the two things you liked MOST about the STUDENT WORKBOOK.

(A) First

--Format. The format (pictures--explanatory sentences, order, sequence) are excellent. Also color coding of workbook manual.

--Ample room for student response.

--The fact that you addressed three levels and handled the materials in this manner.

(B) Second

--That the examples you use reflect experiences of adults.

--Some creative illustrations.

--Materials. (adult experiences)

--Content. The content relates well to everyday experiences of adults.

12. In the spaces below, describe the two things you liked LEAST about the STUDENT WORKBOOK.

(A) First

--Some of the drawings were poor.

--I felt that at times the Student Level I Workbook was too "basic" and repetitive.

--The lettering or typing is in too small letters.

(B) Second

--Put the page numbers on the outer corners so pages are easier to find--not in the middle of the sheet.

--Some directions vague.

13. In the spaces below, describe the two things you like MOST about the Instructor's Guide.

(A) First

--Well organized, easy to follow.

--Complete and easy to follow.

--I would hope, if I were a classroom teacher, that these manuals would constitute a single, complete source, and that I would not need to buy or use other materials.

(B) Second

--Good background and instructional information for the teacher.

--Good practical suggestions; greatly facilitate lesson planning

14. In the spaces below, describe the two things you liked LEAST about the Instructor's Guide.

(A) First

--No particular problems--well done.

--Same as 12. (The lettering or typing is in too small letters.)

--No negative thoughts.

--This is not really a criticism of the Guide; however, the teacher needs to know so much more than the given materials. "What the instructor needs to know" is NOT sufficient background.

(B) Second

--Same as 12. (Put the page numbers on the outer corners so pages are easier to find--not in the middle of the sheet.)

15. In the spaces below, describe the two things you liked MOST about the audio tape script. (LEVEL I only)

(A) First

--Some well organized exercises.

--Same as 11. (The fact that you addressed three levels and handled the material in this manner.)

--Individual pacing is necessary. Tapes allow for this.

(B) Second

--Same as 11. (That the examples you use reflect experiences of adults.

--Broken down into small steps quite well.

16. In the spaces below, describe the two things you liked LEAST about the audio tapes and the audio tape script. (LEVEL I only)

(A) First

--Some parts would be insulting to students.

--Same as 12. (I felt that at times the Student Level I Workbook was too "basic" and repetitive.)

(B) Second

NONE

APPENDIX VII-J

Evaluations and Comments
by
ABE Field-test Instructors

INSTRUCTOR'S QUESTIONNAIRES

	I	Level II	III
2. Were you prepared to teach the materials?			
A. Yes, even before the related in-service training.	0	1	2
B. Yes, after receiving the in-service training.	3	0	0
C. No, I was not as prepared as I would have liked.	0	1	0
D. No, I was uncomfortable teaching the package.	0	0	0
COMMENT:			
However, in-service was very helpful and motivating. (Had marked "A.")			
3. About how many total hours to actual classtime did you spend covering these materials?	$\left. \begin{matrix} 6 \\ 7 \end{matrix} \right\} = 9$ 14	$\left. \begin{matrix} 6 \\ 7 \end{matrix} \right\} = 6\frac{1}{2}$	$\left. \begin{matrix} 7 \\ 9 \end{matrix} \right\} = 8$
4. On the average, how long was each session during which you used the materials?	$\left. \begin{matrix} 1 \\ 1\frac{1}{2} \\ 2 \end{matrix} \right\} = 1\frac{1}{2}$	$\frac{1\frac{1}{2}}{2} = 1.83$	$\left. \begin{matrix} 2 \\ 5 \end{matrix} \right\} = 3\frac{1}{2}$
5. Did you use the materials exactly in the order in which they are organized?			
A. Yes	3	2	2
B. No	0	0	0
6. Was the reading level of the STUDENT WORKBOOK appropriate for your students?			
A. Yes	0	2	2
B. Too High	3	0	0
C. Too Low	0	0	0
7. What changes would you make in the reading level of the STUDENT WORKBOOK?			

Level I

No specific changes, but allow more time to teach and learn necessary vocabulary. I believe the reading level would be enhanced.

I would not make any since this present reading level appears necessary to get metric information across.

<u>Level</u>		
<u>I</u>	<u>II</u>	<u>III</u>

7. What changes would you make in the reading level of the STUDENT WORKBOOK? (Cont.)

Level I (Cont.)

As a teacher I would initiate a word pronunciation and word identifying classroom session with the students who I felt need it, before I would proceed on the tapes for each lesson. The primary purpose of this is to help the student understand what they are reading and listening to at the same time. The tapes should be somewhat slowed down so that they can absorb what they are reading and listening to. This doesn't hold true for everyone.

Level II

None--suitable for the group of ABE who participated. However, they were teacher-led. On the test they were on their own.

Level III

No comments.

8. Was the mathematical level of the STUDENT WORKBOOK appropriate for your students?

A. Yes	2	2	2
B. Too high	1	0	0
C. Too low	0	0	0

9. What changes would you make in the mathematics material in the STUDENT WORKBOOK?

Level I

None.

Teaching students cm, m, kg, g, litre, ml, all in one section at one time is too much and too fast for the student to grasp. The changes I feel that are necessary would be to have section A on Linear Measurement only. The students who are in need of more attention than others should be taught what millimetres are on a centimetre ruler with the aid of millimetre sheets to measure with. When the students seem to understand what mm's are then the instructor can set up activities for them to do, like measuring small objects like pencils, erasers, paperclips, etc. The same applies to cm's and m's and other sections like b,c, d, e, f.

9. What changes would you make in the mathematics material in the STUDENT WORKBOOK? (Cont.)

Level II

Add at the end of each section a set of problems involving the measuring of objects. Entitle the problem sets: NOW TRY THESE ACTIVITIES ON YOUR OWN.

Include word problems, computations.

Level III

None.

I would try to establish a pattern in teaching examples with the use of decimals only.

10. Are there any students for whom you could not recommend the use of these materials?

A. No	2	1	1
B. Yes (Please describe the types of students)	1	1	1

Level I

It would be very difficult for those students that are first entering Adult Basic Education. This metric material would simply be too much or too overwhelming for them to handle.

Level II

Those with lower reading levels--01, 02, 03.

Level III

Students that are first entering ABE, since this material may be too overwhelming.

11. How appropriate were the materials for your course?

A. Very appropriate	3	2	2
B. Somewhat appropriate	0	0	0
C. Very inappropriate	0	0	0

COMMENTS:

Made students more aware of the use of the metric system in the near future.

Most were very appropriate.

The materials thus used were very appropriate and served the purpose in stimulating interest in learning metrics among the students.

		Level		
		I	II	III
12.	Would you use this Adult Basic Education material again?			
A.	Yes, without any changes being made in it	2	0	0
B.	Yes, but only if a few important changes are made in it.	1	2	2
C.	Yes, but only if major changes are made in it	0	0	0
D.	No	0	0	0

COMMENTS:

Changes, if any, would be slight--only in necessary vocabulary.

[Yes] except for the audio tapes.

Students need more time to do these materials. It was too much material for the time allowed. (Level I)

13.	Would you recommend this ABE material to other teachers?			
A.	Yes, quite strongly	2	2	1
B.	Yes, somewhat	0	0	1
C.	Yes, but not very strongly	1	0	0
D.	No	0	0	0

COMMENTS:

Certain changes would have to be made. (Level I)

14.	Overall, how would you rate the quality of this material?			
A.	Excellent	0	0	1
B.	Very Good	2	2	0
C.	Good	1	0	1
D.	Average	0	0	0
E.	Poor	0	0	0

COMMENTS:

You may have people who have difficulty seeing even with glasses on! I recommend: (A) a larger celsius thermometer so that the students can see the lines a little better, (B) important changes in the student workbook should be noted, (C) a metre stick, cm ruler with larger mm lines on them, etc.

	I	Level	
		II	III
15. The STUDENT WORKBOOK was clearly written and complete.			
A. Strongly agree	0	0	0
B. Agree	2	2	1
C. No opinion	1	0	1
D. Disagree	0	0	0
E. Strongly disagree	0	0	0
16. The Instructor's Guide was clearly written and complete.			
A. Strongly agree	0	1	0
B. Agree	3	1	2
C. No opinion	0	0	0
D. Disagree	0	0	0
E. Strongly disagree	0	0	0

COMMENTS:

The Instructor's Guide was very helpful.

17. In Level I, the speaker on the cassette tape spoke

A. Too fast	1
B. The right speed	1
C. Too slow	1

COMMENTS:

This doesn't apply to all students but a select few had difficulty in trying to locate the words the speaker mentioned on the cassette tape. This is partly due to a reading problem and can be corrected with a word pronunciation and reading session. (Had marked "A")

The pauses were too long; students became bored. Seemed impersonal to them. (Had marked "C")

18. In Level I, the cassette tapes were

A. Easy to hear and easy to understand	3
B. Easy to hear but hard to understand	0
C. Hard to hear but easy to understand	0
D. Hard to hear and understand	0

COMMENTS:

It was easy to hear and easy to understand, but was too fast for some students to comprehend or grasp.

	Level		
	I	II	III
19. Generally speaking, the STUDENT WORKBOOK was written at an appropriate level for most of my students.			
A. Strongly agree	0	0	1
B. Agree	2	2	1
C. No opinion	1	0	0
D. Disagree	0	0	0
E. Strongly disagree	0	0	0

COMMENTS:

This is a difficult thing to determine due to the limited time we had. You would have to have the students read back to the teacher or pronounce certain words in order to know.

20. Teaching the materials in this package took too much time.

A. Strongly agree	1	0	0
B. Agree	0	0	1
C. No opinion	0	0	0
D. Disagree	2	1	1
E. Strongly disagree	0	1	0

COMMENTS:

It was too much material to teach with such a short time to cover. It took too much time to organize and condense the material to be used within that hour, and there were other things to do, but time ran out. It was very frustrating. (Level I) (Marked "A")

For the nine hours of instruction I feel that the material needs to be condensed or a longer period of time is needed to cover material. (Level III) (Marked "B")

We had problems with time because we did not allow enough time. We only had 6 hours in which to do it. (Level III) (Marked "D")

21. The organization and format of the materials facilitated the instructional process and made it easier.

A. Strongly agree	0	1	0
B. Agree	2	1	2
C. No opinion	0	0	0
D. Disagree	0	0	0
E. Strongly disagree	1	0	0

	Level		
	I	II	III

21. The organization and format of the materials facilitated the instructional process and made it easier. (Cont.)

COMMENTS:

It actually made it more difficult because it was too much material and very little time to work them. Also, it was too much material to cover in Section A, B, C, D, E, F,--for the students to comprehend in a short time. In Section A, you had m, cm, kg, g, ml, l, etc. This is too much for the students to digest. (Level I) (Marked "E")

I feel more practice and application questions should be included in the program. (Level III) (Marked "B")

22. As we were going through these materials, I found that the students had difficulty "thinking metric."

A. Strongly agree	0	0	0
B. Agree	0	2	1
C. No opinion	0	0	0
D. Disagree	3	0	1
E. Strongly disagree	0	0	0

COMMENTS:

The students seem to enjoy it very much and were "thinking metric" from the very beginning to the very end of the program. (Level I) (Marked "D")

In first lessons, but not later. (Level I) (Marked "D")

The newness of the terms impedes immediate understanding. They need to "live" with it much longer. (Level II) (Marked "B")

23. I feel this package will fit very well into my regular instructional program.

A. Strongly agree	0	0	0
B. Agree	2	2	1
C. No opinion	0	0	0
D. Disagree	0	0	1
E. Strongly disagree	1	0	0

COMMENTS:

Yes, if the teacher could choose time for teaching, etc. (Level I) (Marked "B")

	Level		
	I	II	III
23. I feel this package will fit very well into my regular instructional program. (Cont.)			
COMMENTS: (Cont.)			
Certain changes would have to be considered in the package in order for it to fit into my regular instructional program--condensation of material, etc. (Level I) (Marked "E")			
For the population for which it is designed, yes. (Level II) (Marked "B")			
Will teach as a special class next semester. (Level III) (Marked "D")			
24. The material in the STUDENT WORKBOOK corresponded with the OBJECTIVES that were given in the Instructor's Guide.			
A. Strongly agree	0	0	0
B. Agree	2	2	2
C. No opinion	0	0	0
D. Disagree	1	0	0
E. Strongly disagree	0	0	0
COMMENTS:			
The Instructor's Guide in my opinion did not totally correspond with the material in the Student Workbook. It was too wordy and should be condensed to match up with the material in the Student Workbook. (Level I) (Marked "D")			
25. Overall, how would you rate the metric information in THE INSTRUCTOR NEEDS TO KNOW section of the Instructor's Guide?			
A. Excellent	0	0	0
B. Very good	0	2	2
C. Good	3	0	0
D. Average	0	0	0
E. Poor	0	0	0
COMMENTS:			
It serves its purpose in giving you an idea of how to prepare and present the material to the students. (Level I) (Marked "C")			
Need a little more information about a hectare. Too isolated as written in student text. (Level II) (Marked "B")			
I compared both side-by-side to make sure I knew what the students would be doing. (Level III) (Marked "B")			

	I	Level II	III
26. The COMMENTS in the Instructor's Guide were clearly written and helped me conduct the Activities.			
A. Strongly agree	0	0	0
B. Agree	3	2	2
C. No opinion	0	0	0
D. Disagree	0	0	0
E. Strongly disagree	0	0	0

COMMENTS:

It helped me considerably (Level I)

27. The lists of MATERIALS NEEDED for each activity in the Instructor's Guide were clearly written and complete.

A. Strongly agree	0	0	1
B. Agree	2	2	1
C. No opinion	1	0	0
D. Disagree	0	0	0
E. Strongly disagree	0	0	0

COMMENTS:

Something needs to be done with clinical thermometer section. Also, p. 23, Instructor's Guide. Clinical thermometers are hard to come by--expensive! (Level II) (Marked "B")

28. The RESOURCES section of the Instructor's Guide was very helpful.

A. Strongly agree	0	0	0
B. Agree	2	2	1
C. No opinion	1	0	0
D. Disagree	0	0	0
E. Strongly disagree	0	0	0
No Response			1

29. The RESOURCES section of the Instructor's Guide should have included more on the following:

Kilogram scale, centimetre rulers, plastic cubes (gram scale), ml, litre containers, millilitre spoons, etc.

30. In the spaces below, describe the two things you liked MOST about the STUDENT WORKBOOK.

Level I

- (A) First: The student workbook was clearly written in large lettering for good viewing

30. In the spaces below, describe the two things you liked MOST about the STUDENT WORKBOOK. (Cont.)

Level I (Cont.)

- (A) First: I thought the Student Workbook was very well constructed. None of my 19 students (ages 18-100) complained and at least five made no errors on the post-test!

Illustrations.

- (B) Second: Repetitions.

The pictures were very clear and you knew what each object was.

Level II

- (A) First: Activity centered. Learn by doing

Related metrics to everyday situations.

- (B) Second: Effective illustrations.

Excellent selection of activities--relevant to the "real world."

Level III

- (A) First: Sequence of activities to be done.

Written at a level where my students could read without frustration.

- (B) Second: The activities were very meaningful to the students.

Illustrations were good and relative to the adult.

31. In the spaces below, describe the two things you liked LEAST about the STUDENT WORKBOOK.

Level I

- (A) First: I did not like, for instance, Section A where the metre, centimetre, gram, kilogram, litre, millilitre were right after each other. That's too much at one time and too fast for the students to absorb. This is likewise for section B, C, D, E, and F as well.

- (B) The pictures in the student workbook should be arranged from the beginning to show small objects for the students to work, such as a pencil, glass, eraser, book, in terms of millimetres, centimetres, and metres. The larger objects such as a sofa, book shelves, doors, windows, should follow afterwards. These pictures should be confined to just millimetres, centimetres, and metres only, in Section-A.

Level II

- (A) First: Needs more computational/word problem type exercises.

Lack of "Do it yourself" exercises/activities to assist student in transfer and application of what he is trying to learn. In a class setting he needs to "practice" some while teacher is yet available to assist only when needed.

31. In the spaces below, describe the two things you liked LEAST about the STUDENT WORKBOOK. (Cont.)

Level II (Cont.)

- (B) Second: The recipes should be labelled "optional", or provision made for students to try at home, yet do in class if situation is suitable.

Level III

- (A) First: Materials should show more step-by-step, showing the student a clear-cut way to do problem; i.e., rules should be established for changing from one measurement to another.

Maps could be drawn with more accuracy for better measurements.

- (B) Second: Wrong answers need to be corrected.

Some questions were asked with answers following while some questions were asked without any answer following. There should be some consistency here.

32. In the spaces below, describe the two things you liked MOST about the Instructor's Guide.

Level I

- (A) First: It tends to give you an idea of how to go about preparing your material and how to go about doing it.

It definitely helped to reinforce the in-service training I received in Columbus and made me feel more secure in my instructing.

Specific directions.

- (B) Second: Listing of materials and resources.

It tells you what materials to use and how to use it, which is good.

Level II

- (A) First: Introduction: current, relevant. Very appropriate for what is now being done in Florida. 11th graders having to pass a functional literacy test (APL directed.)

Gave required background information

- (B) Second: What the instructor needs to know.

Level III

- (A) First: List of materials needed for each activity.

Listed materials for use in the class.

- (B) Second: Objectives well defined.

I feel that "What the Instructor Needs to Know." is good for many teachers who are not familiar with the metric system.

33. In the spaces below, describe the two things you liked LEAST about the Instructor's Guide.

Level I

(A) First: Material is too wordy and needs to be condensed to match with the student workbook.

(B) Second: It lacks pictures to match with the pictures in the student workbook.

Level II

(A) First: Nothing. Instructor's Guide well planned and written.

Level III

No comments.

34. In the spaces below, describe the two things you liked MOST about the audio tape script. (LEVEL I only)

(A) First: It was very helpful in preparation for the post-test for the students.

For me, they seemed clear and well done.

Very clear.

(B) Second: It was well written, organized, concise, to the point.

Very specific.

35. In the spaces below, describe the two things you liked LEAST about the audio tapes and the audio tape script. (LEVEL I only)

(A) First: Picture 1 may be a little confusing to the students where the woman is measuring the window with a metre stick.

They required too much class time; pauses were too long; students learned faster and were happier when I read the material to them initially, after which we read together or individuals read sentences orally to class.

(B) Second: The test may be a little overwhelming for some students who had difficulty comprehending or grasping this material in such a short time, with the way it was presented in the student workbook.

APPENDIX VIII-A

In-service Workshop Plan
For
10 USOE Regions

INSERVICE PLAN
FOR
METRIC EDUCATION
WORKSHOPS

TABLE OF CONTENTS

	page
Outcomes of the Workshop	1
Recruitment	3
Recruitment procedure	4
Approach	10
Diffusion Strategy	10
Workshop Activities	12
ABE Component	13
Vocational Component	17
Dissemination/Implementation Strategies	23
Evaluation of Workshops	26
Follow-up Activities	31

The inservice workshops to be conducted in each of the 10 USOE regions have as their primary goal the dissemination and utilization of the metric materials produced by this project for vocational-technical and adult basic education.

In order to achieve this outcome, our workshop plan incorporates the following:

- 1) The provision of trainers within the state who can:
 - a) Train teachers of ongoing V-T and ABE programs in metric and in the use of the vocational-technical and adult basic education metric packages.
 - b) Train teacher educators in the use of these materials.
 - c) Be available as resource persons.
- 2) The development of a dissemination strategy by State, which
 - a) Will locate complete sets in sites within states with the capability of reproducing the packages and making them accessible to users on request.
 - b) Will develop an awareness campaign within the state.
 - c) Will provide feedback to users on additional sources of help within the state, if required.
- 3) The development of an implementation strategy for each state which
 - a) Define costs of installation, including inservice needs, hardware acquisition, curriculum materials, facilities, etc.
 - b) Define timelines, including lead time activities, such as inservice training, ordering and acquiring materials; teacher planning time; operations time such as daily preparation, classroom activities time; and cyclical concerns such as during what part of the academic year should installation take place.

- c) Define installation concerns such as resistance to be expected from school personnel, from students; policy changes at the state or local level which may be required, etc.
- d) Specify ~~space~~ requirements and how to plan for them.
- e) Specify equipment needs such as hardware and curriculum materials.

Our experience in training over 290 teachers to field test our metric packages and discussions with SEA staff made very clear to us that the objectives discussed above can be met in one and a half day workshops. SEA and LEA personnel would have a very difficult time obtaining permission to attend training sessions of any longer duration. To ensure a higher probability of good attendance at our workshops we have planned activities for one and a half days.

RECRUITMENT

The following target audiences will be invited to participate in the workshops:

For ABE and V-T

1. State directors
2. Local directors
3. Program area supervisors
4. Curriculum laboratories personnel
5. Teacher educators
6. RCU personnel
7. Metric Resource Center personnel (in states that have them)
8. NNCCVTE personnel
9. LEA personnel

There will be 75 participant slots allocated to each workshop, 20 for ABE personnel and 55 for vocational technical personnel. A proportionate number of persons will be requested from each state. For example, there are 6 states in Region I. Each state will be asked to send 3 ABE persons and 9 V-T persons and be told that there are 2 additional slots available for ABE, and 1 additional slot available for V-T on a first-come, first-serve basis. We will hold State allotments, but if they are not filled, we will take applicants from other states in the Region until the 75 slots are filled.

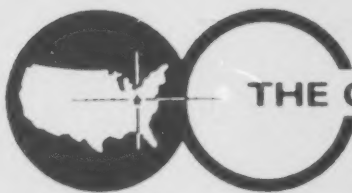
A procedure for handling participant recruitment follows.

RECRUITMENT PROCEDURE

1. Letter or memo from USOE/BOAE to Assistant Regional Commissioners, OAE, requesting their support for pending workshops.
2. Telephone contact with each of the Assistant Regional Commissioners to determine workshop dates in their Region, request their help in locating a facility, locating a hotel for overnights, and asking permission to use their names as co-hosts of the workshop.
3. Within region, letters to go to State Directors of Vocational Education, State Directors of Adult Education asking them to recommend participants to workshops who will provide statewide leadership as trainers, disseminators and implementers. (See letter A attached). Copies of letters sent to Assistant Regional Commissioner, and to other program officers (e.g. adult education) if specified, for their information.
4. When lists of participants are received letters will be sent to each individual naming location of workshops and recommended hotel. Individuals will be asked to return a prepaid postcard informing us if they are or are not attending the workshop. (See letter B attached).

A copy of the form letter will go to the State directors for their information.

A (Adult Education)



THE CENTER FOR VOCATIONAL EDUCATION

The Ohio State University • 1960 Kenny Road • Columbus, Ohio 43210

Tel: (614) 486-3655

Cable: CTVOCEDOSU/Columbus, Ohio

To State Director of Adult Education

(Name) Assistant Regional Commissioner

and the Center for Vocational Education are co-hosting a 1-1/2 day Metric Education Workshop for vocational, technical and adult educators. It will be held in (name of city) (date) in Region (number).

Under a contract with BOAE/USOE, the Center for Vocational Education developed 55 metric instructional packages for 77 vocational programs areas, and three levels of adult basic education materials for adults functioning at grades 1 through 9. These materials were field-tested in ten states and were then revised on the basis of the field-test findings to be as responsive as possible to classroom needs.

The goal of the workshop is to make it possible for the leadership in your state to provide training in the use of the materials, disseminate them, and install them in appropriate programs.

The workshop will prepare trainers, help participants develop a dissemination strategy based on the communications linkages now available in your state, and help participants develop an implementation guide tailored to each state. The Center will locate a number of complete sets of the materials in each state at sites determined by the state.

We are requesting that you recommend # ABE participants from your state who can provide statewide leadership in these activities. It may be desirable to have representatives from an LEA attend, who would like to install these materials into their ABE programs and provide you with a demonstration site.

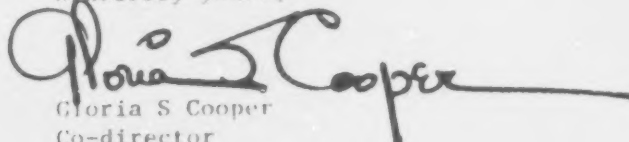
We can hold # ABE slots for the state of (name). However, if you are unable to fill all the slots, we would then reallocate the unfilled ones to other states in the Region. We have enclosed a form for you to fill out with the names and addresses of attendees, and request that you name 3 additional alternates who may be able to attend should there be additional slots available. We will then send hotel registration forms and workshop information to the attendees.

Unfortunately, we are not able to reimburse any costs for attending the workshop. However, there is no charge for attending or receiving the workshop materials.

We would appreciate receiving your list of attendees within ten days of receipt of this letter, but no later than (date).

Enclosed is a list of program packages and a brief description of the project.

Sincerely yours,


Gloria S Cooper
Co-director
Metric Education Project

cc:cg

Enclosures



THE CENTER FOR VOCATIONAL EDUCATION

The Ohio State University • 1960 Kenny Road • Columbus, Ohio 43210
 Tel: (614) 486-3655 Cable: CTVOCEDOSU/Columbus, Ohio

To State Director of Vocational Education

(Name) Assistant Regional Commissioner
 and the Center for Vocational Education are co-hosting a 1-1/2
 day Metric Education Workshop for vocational, technical and adult
 educators. It will be held in (name of city) (date)
 in Region (number)

Under a contract with BOAE/USOE, the Center for Vocational
 Education developed 55 metric instructional packages for 77 voca-
 tional program areas, and three levels of adult basic education
 materials for adults functioning at grades 1 through 9. These
 materials were field-tested in ten states and were then revised
 on the basis of the field-test findings to be as responsive as
 possible to classroom needs.

The goal of the workshop is to make it possible for the
 leadership in your state to provide training in the use of the
 materials, disseminate them, and install them in appropriate
 programs.

The workshop will prepare trainers, help participants develop
 a dissemination strategy based on the communications linkages now
 available in your state, and help participants develop an imple-
 mentation guide tailored to each state. The Center will locate
 a number of complete sets of the materials in each state at sites
 determined by the state.

We are requesting that you recommend # vocational education
 participants from your state who can provide statewide leadership
 in these activities. We suggest that you include your RCU Director,
 your Curriculum Liaison Representative,
 your Career Education Coordinator, one or more
 vocational program supervisors, vocational-technical post-secondary
 representatives, and vocational teacher educators. In addition,

It would be desirable to have representatives from an LEA attend, who would like to install these materials into their vocational programs and provide you with a demonstration site. Finally, a representative of your State Advisory Council may wish to attend.

We can hold # slots for the state of (name). However, if you are unable to fill all the slots, we would then reallocate the unfilled ones to other states in the Region. We have enclosed a form for you to fill out with the names and addresses of attendees, and request that you name 4 additional alternates who may be able to attend should there be additional slots available. We will then send hotel-registration forms and workshop information to the attendees.

Unfortunately, we are not able to reimburse any costs for attending the workshop. However, there is no charge for attending or receiving the workshop materials.

We would appreciate receiving your list of attendees within ten days of receipt of this letter, but no later than (date).

Enclosed is a list of program packages and a brief description of the project.

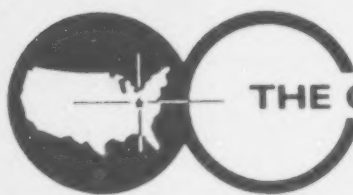
Sincerely yours,



Gloria S Cooper
Co-director
Metric Education Project

GSC:cg

Enclosures



THE CENTER FOR VOCATIONAL EDUCATION

The Ohio State University • 1960 Kenny Road • Columbus, Ohio 43210
Tel: (614) 486-3655 Cable: CTVOCEDOSU/Columbus, Ohio

February 25, 1977

Dear Participant:

Your State Director has recommended that you participate in the Metric Inservice Workshop for Vocational, Technical and Adult educators which will be held in Denver, Colorado, on March 29 and 30, 1977.

The primary goal of the workshop is to help each of the states develop its own capability to train its teachers in the use of the 55 metric packages developed for 77 vocational program areas, and in the use of the adult basic education metric packages developed for three levels of ABE students: those functioning at grades 1-3, at grades 4-6, and grades 7-9. To achieve this outcome the workshop will have three thrusts. The first is to develop trainers within the states who can run workshops for vocational educators and for ABE educators. The second thrust is to help each state develop its own dissemination strategy, and the third is to help each state develop its own implementation guide.

The workshop will be held at the Cosmopolitan Hotel, 1780 Broadway, Denver, Colorado, 80202. The workshop will be held from 9:00 a.m. to 5:00 p.m. on Tuesday, March 29. The second day will run from 9:00 a.m. until 2:30 p.m. Room reservation cards are enclosed so that you may make your own hotel arrangements. The charge will be \$18.00 for a single and \$24.00 for a double or a twin.

Please fill out the enclosed card and return to us at the above address. We can only reserve a slot for you until March 14, 1977. May we hear from you by then in order to prepare the appropriate workshop materials you will need.

We look forward to working with you at the Metric Inservice Workshop.

Sincerely,

Gloria S. Cooper
Gloria S. Cooper
Co-director
Metric Education Project

GSC:pt

Enclosure

APPROACH

Diffusion Strategy

If we think of metric instructional packages as a type of innovation, then¹ Corwin's² research suggests that installation occurs if a combination of the following conditions are present:

1. "A dominant outside organization staffed by competent and liberal members.
2. Competent, receptive boundary personnel in the host organization and,
3. Functional interdependence and channels for cooperation to take place."

The Center for Vocational Education fulfills the first condition. As an outcome of the 10 USOE Regional Workshops to be conducted this spring (1977), the second condition will be met. A small cadre of metric trainers will be available within each state, each of whom was recommended for training by the state's Directors of Vocational and Adult Education. The third condition is met through the linkages established with every state in the country in the development of implementation guides and dissemination strategies customized for unique differences among the states.

Once the Center has conducted the workshop in each region, a functioning model will then be available for replication at the discretion of the State, utilizing competent leadership within the state. The Center's function at this point would have been to implement a self-help delivery system for the installation of metric packages within ongoing vocational and adult basic education programs.

The findings of Orlosky and Smith³ indicate that "changes in instruction are most likely to originate within the education profession, that a change requiring the teacher to abandon an existing practice and displace it with a new practice risks defeat, that curricular changes involving the addition of subjects, or the

up-dating of content are more permanent than changes in the organization and structure of the curriculum." And finally, "the source of the change appears to have far less to do with its staying power than the support the change receives and the strain it places upon the school personnel."

The materials, developed with the help of vocational, adult and math educators, are consistent with existing instructional practices, involve the up-dating of content (SI metric), and reflect the latest specifications of SI metric standards. They are, therefore, consistent with the requirement for change specified by Orlosky and Smith.

The Workshops we are conducting under the sponsorship of the U.S. Office of Education provide the institutional support required for this activity in order to install the curriculum change. In addition, teachers from the local educational agencies would be participating and trained in the use of tested materials. This kind of effort would reduce potential strain on school personnel. Finally, metric resource persons would be available within the state if needed.

WORKSHOP ACTIVITIES

1. The Provision of trainers within states.

The first day of the workshop will prepare the participants as trainers. After a general introduction to the need for metric and the impact it will have on vocational and adult education, the participants will divide into two groups, an ABE group and a vocational group. The rest of the day will be spent on trainer activities. The following agendas and work-session plans specify the objectives, the procedures and activities for the ABE component and for the Vocational component of the training.

At 4:30 of the first day, the two groups will merge and prepare for the next day's activities by identifying the training needs of teachers within the state. The group will examine such variables as teacher attitudes, scheduling constraints, teaching competencies needed for metric, and follow-up needs. The technique to be used will be role-play.

2. Implementation and Dissemination Strategies.

The second day's activities involve the participants in the development of implementation and dissemination techniques applicable to their state's capabilities. The agenda and workshop activities follow.

The Innovations Evaluation Guide, developed at the Center for Vocational Education, will be used by the participants to generate the data they will need to define dissemination and implementation components. The outputs of these activities will be collected by the workshop staff to be incorporated into the Implementation guide to be developed as the final product of the project.

USOE REGIONAL WORKSHOPS

METRIC EDUCATION PROJECT

ABE COMPONENT

Day 1

9:00--9:45	Registration and general information
9:45--10:00	Coffee
10:00--12:00	Unit 1: Level I, Section A
12:00--1:00	Lunch
1:00--2:00	Unit 2: Level I, Sections B-F
2:00--2:30	Unit 3: Level II, Area
2:30--3:15	Unit 4: Level III, Volume and Capacity
3:15--3:30	Coffee
3:30--4:15	Unit 5: Level III, Mass and Temperature
4:15--4:30	Evaluation
4:30--5:15	Workshop strategies
5:15--5:30	Summary and overview



OBJECTIVE	PROCEDURE	COMMENT
Participants will be able to list the components of the ABE Level I materials.	1. Assemble metric materials needed at learning stations.	1. Set up separate learning stations for Learning Activities 1, 6, and 8. The station for Learning Activity 1 will be used for all Learning Activities except 6 and 8.
	2. Introduce ABE Level I.	2. Describe components of ABE Level I Section A: Student Workbook, Audio Tape and Audio Tape Script, Instructor's Guide (Objectives, What the Teacher Needs to Know, Materials Needed) and time lines.
	3. Play audio tape, section A. Have participants follow along in Student Workbook pages 1-8.	3. Model prescribed teaching techniques.
	4. Learning Activities 1, 2, 3.	4. Help students learn to use the metre sticks and acquire an intuitive grasp of its size. Give participants enough time to feel comfortable with the sticks.
Each participant will complete the specified hands-on activities.	5. Learning Activity 4.	5. Give the participants many opportunities to estimate sizes in metres. Give them enough time to acquire some proficiency in estimating.
	6. Learning Activity 5.	6. Help students learn to use the centimetre rulers and acquire an intuitive grasp of the size of a centimetre.
	7. Learning Activity 6.	7. Have students measure the items on the resource table. If they want more metre practice, have them measure other small objects around the room.

453

480



THE CENTER FOR VOCATIONAL EDUCATION

SUGGESTED LESSON PLANS

ABE Unit 1: Level I, Section A Continued

Day 1:

MATERIALS NEEDED

Audio-cassette tape player;
Extension cord;
Level I, Tape A;
Metre Sticks;
Centimetre rulers;
Metric tape measure;
"Figure It In Metrics" Wall Chart, Butterick Pub. Co.;
Chalkboard eraser;
Pencil;
Book;
Coffee pot

PROCEDURE

COMMENT

8. Learning Activity 8

8. Help student learn to use the metric tape measure. Give assistance whenever needed.

9. Review parts of ABE, Level I, Section A in Student Workbook, Instructor's Guide, and Audio Tape Script.

9. Review and discuss parts. Answer questions.

ABE Unit 2: Level I, Sections B-F

Day 1:

PROCEDURE

COMMENT

Participants will make a lesson plan for one of the Level I, Sections B-F showing how the Level I components for this section will be used.

1. Briefly describe the contents of Sections B through F.

1. Emphasize that Sections C and F are for evaluation by the students of their progress. Show components and describe time lines.

2. Provide participants with a copy of lesson plans for the ABE aspect of these workshops. Answer questions and provide any assistance that is needed.

OBJECTIVE

PROCEDURE

COMMENT

Participants will be able to list the components of the ABE Level II materials.

1. Assemble metric materials needed at learning stations.
2. Introduce ABE Level II
3. Have participants read pp. 23-29 of Level II Student Workbook and ask them to perform the metric activities described on those pages.

1. Some of the materials will be in the V-I sections of the room.
2. Describe components of ABE Level II: Student Workbook (Introduction to a Unit, Doing Metric Activities, Metrics at Work & at Home) and Instructor's Guide (Materials needed, What the Teacher Needs to Know, Objectives, Comments, Resources, References, etc.) time lines and suggested teaching techniques.
3. Model prescribed teaching method. Participants may have to do some of the prior activities before they can do Activities 18, 19, 20. For example, before they can do Activity 20, they will have to find the size of the room in metres. If the workshop is held in a large room, like a ballroom of a hotel, you may want them to only measure a section of it.

455

STANDARD LESSON PLANS

ABE UNIT 40: Level III, Volume and Capacity

Day 1:

OBJECTIVE	PROCEDURE	COMMENT
Participants will be able to list the components of the ABE Level III materials.	1. Assemble metric materials needed at learning stations.	1. Some of these may be in the V-T sections of the room.
Participants will make a lesson plan for Level III, Volume and Capacity showing how the Level III components for this chapter will be used.	2. Introduce ABE Level III.	2. Describe components of ABE Level III: Student Workbook (Introduction to a Unit, Doing Metric Activities, Metrics at Work & at Home) and Instructor's Guide (Materials needed, What the Teacher Needs to Know, Objectives, Comments, Resources, References, etc.) time lines and suggested teaching techniques.
MATERIALS NEEDED	3. Have participants read pp. 30-46 of Level III Student Workbook and ask them to perform the following metric activities: 24, 25, 26, 27, 28, 31, 33, and 35.	3. Participants may need some help in doing these. For Activity 28 they will need the data from Activity 20 (Level II) which they did in the previous lesson.
Metric ruler for each participant	4. Have participants prepare a lesson plan over this section or its Level II counterpart.	4. Show them the appropriate materials in the Instructor's Guide. Make sure they see the Objectives and the Comments for the activities.
Blocks, small boxes, brick		
Watertight rectangular container		
Inside caliper		
Rock, apple, water, rice		
Coffee cups, juice glass		
Soft drink container		
Pots and pans		
Litre measuring cup		
Set of measuring spoons		
48 Medicine prescription bottles		
Empty fruit and vegetable cans		

456

486

SUGGESTED LESSON PLANS

ABE Unit 3: Level III, Mass and Temperature

Day 1:

OBJECTIVE	PROCEDURE	COMMENT
Participants will be able to identify the components of the ABE Level III Mass and Temperature Chapters.	1. Briefly outline the Level III Mass and Temperature sections. 2. Evaluation	1. This is a brief overview of these sections. Present a brief sketch of the sections and then answer questions. 2. Administer ABE Evaluation

ISOE REGIONAL WORKSHOPS METRIC EDUCATION PROJECT

Vocational-Technical Component

Day 1

9:00-9:45	Registration and general information for participants Lunch
9:45-10:00	Coffee
10:00-10:30	Introduction to metric packages (30 minutes)
10:30-12:00	Unit 1 - Introduction to Metric Units Exercises 1-9 (1 hour 30 minutes)
12:00-1:00	Lunch
1:00-2:00	Complete Exercises 1-9 (30 minutes) Large Group Discussion (30 minutes)
2:00-2:45	Unit 2 - Metrics in This Occupation - Table 2
2:45-3:00	Unit 2 - Exercises 6 and 7
3:00-3:15	Unit 3 - Metric-Metric Conversion
3:15-3:30	Unit 3 - Metric Instruments and Devices (Diagrams)
3:30-3:45	Coffee
3:45-4:00	Complete Unit 4 - Lesson Plan
4:00-4:15	Unit 5 - Metric-Customary Conversions
4:15-4:30	Evaluation
4:30-5:15	Workshop Strategies
5:15-6:30	Summary and Overview

V-T PACKAGES Unit 1: Introduction to Metric Units

Day 1:

OBJECTIVE	PROCEDURE	COMMENT
The participants will identify the components of the V-T packages and match each component with its description. Each participant will complete the specified hands-on activities.	1. Assemble devices and objects to be measured at learning stations (20 minutes - before allotted presentation time). 2. Introduce the V-T Packages (30 minutes) a) Make sure every participant has an appropriate set b) Point out location of main features. Format includes: 1) Teaching-learning strategies 2) Objectives 3) Suggested Teaching Sequence 4) Information Sheets 5) Exercises 6) Supporting Material 7) Test items 8) Answers to Exercises and Test 9) Equipment list 10) References	1. Set up separate stations for Linear, Area, Volume, Mass, Temperature Information provided from experience with packages. For guidance - <u>only</u> suggested Can be presented orally, duplicated, expanded. Reproduced on overhead visuals Examples for each section can be expanded. For beginning exercises and special tools and devices for each occupation. Selected for general information and specific for each occupation
MATERIALS NEEDED Metric measuring devices (metric sticks, rulers, tapes, scales, thermometers, measuring containers) Objects to be measured (attached list) Printed information and exercises from Unit 1 Pencils Overhead projector, visuals, and screen Evaluation Sheet		

PROCEDURE	COMMENT
d) Explain sequence and purpose of following activities:	
1) Unit 1	Introduction to metric units, hands-on experience, example of how that section can be conducted.
2) Unit 2	Experience in occupationally related measuring exercises and writing lesson plans for these materials.
3) Unit 3	Experience in metric-metric conversions; example of how to present the materials.
4) Unit 4	Introduction to metric measuring devices particular to each occupation; experience in writing lesson plans for the materials.
5) Unit 5	Experience in using conversion formulae and charts, example of how the materials can be presented.
e) Point out differences in some packages:	
1) Combined	Expanded or extra exercises
2) BOE	Different Unit 4 orientation
3) Wastewater	Extra Unit on combined expressions

PROCEDURE	COMMENT
3. Introduction to Metric Units (2 hours)	
a) Briefly explain the purpose of the learning tables for Length, Area, Volume, Mass, and Temperature and how to use the Unit 2 Exercises. Direct the participants to divide themselves evenly at each table and work through the Unit 1 exercises at their own pace.	Explain that this section should be taken one area at a time and in order: Linear, Area, Volume, Mass, Temperature, and more time spent with students. Expediency requires that all the exercises be sampled in what order they can be arranged.
b) Circulate among participants to answer questions, obtain materials, and smooth out problems.	Provide positive reinforcement - estimating within 25% is "excellent" for this activity.
c) Direct participants to complete activities within one half hour.	
d) Evaluation	Visual check of participants' work sheets.
4. Large Group Follow Up ($\frac{1}{2}$ hour)	Discuss:
a) Call group together for follow up discussion. Present tables 1-a and 1-b and rules of notation	- Base units and their symbols - The use of prefixes and their symbols - The rules of notation
b) Discuss useful references they have found for metric units and values. Discuss how this exercise can be most effectively used in the classroom.	Table 1-a can be used in the discussion. Using metric estimates in daily life and work tasks helps maintain and improve skills. Requiring metric measurements be used in classroom tasks and on tests keep student skill levels high.

MATERIALS FOR LEARNING STATIONS

(Unit 2)

Linear

- 4-6 Metre sticks
- 4-6 Centimetre/millimetre rules
- 2-4 150 cm cloth tapes
- 10 Paper clips, giant size
- 2 Postage stamps on envelopes
- 3 Bolts (any size)
- 2-4 Buttons, large or medium
- 3-4 Coins, different sizes

Area

- *2-4 Plastic grids
- 2-4 Metre sticks
- 2-4 Centimetre/millimetre rules
- 6 Index cards (small or medium size)
- 2 Postage stamps on envelopes
- 2 Photographs, medium-sized newspaper or magazine
- * 1 10 metre tape
- 2-4 Full sheets of newspaper
- 3-4 Coins, different sizes
- 1 Wall chart or poster

Mass

- 1 Gram balance scale
- 1 Gram/kilogram scale
- * 1 Personal scale
- 1-2 Textbooks (approx. 1 kg each)
- 1 Bag of sugar 2 lb. or 5 lb.)
- 1 Package of paper
- 1-2 Packages of margarine (1 lb.)
- 1 Bag of rice (approx. 1 kg)
- *20-30 Plastic gram cubes
- 1 Bag of nails (approx. 1 kg)
- 20-30 Paper clips, giant size
- 10 Thumb tacks
- 1 Two page letter in envelope
- 1-3 Apples
- 1 Litre beaker

Temperature

- 2-4 Thermometers, Celsius or centigrade, plastic or metal back, -30°C to 110°C (approximately)
- 3-4 Containers
- *1-2 Clinical thermometers, Celsius

Volume

- 2-4 Metre sticks
- 5-10 Centimetre cubes
- 1-3 Litre boxes, plastic or cardboard
- 1 Index card file box
- 3-6 Freezer containers, plastic, 1-2 each of 3 different sizes
- 1 Paper clip box
- 1-2 Millilitre/litre beakers, plastic or glass
- *1-2 Measuring cups; 250 or 500 ml
- 1-2 Bottle, quart or larger
- 1-2 Jugs, 1 qt. - 1 gal.
- * 1 Funnel
- 1 Bag of rice (approx. 2-5 lbs.)
- 1-2 Small juice cans (8 oz. size)
- 1-2 Juice cans (12 oz. size)
- 1-2 Soft drink cans (standard size)
- 6 Paper cups or drinking glasses
- * 1 Coffee cup
- 1 Square metre, paper
- 1 Bottle, small
- 1 Spoon, table or tea
- 1 Bucket of water
- 1-2 Measuring spoons, plastic, 1 ml, 5 ml, 15 ml, 25 ml
- 1 Box of staples

* Optional

OBJECTIVE	PROCEDURE	CONTENT
Each participant will review and customize Table 2 for his/her program area.	1. Customize Table 2 (45 minutes) a) In small groups or individually, have participants: 1) List what is measured in their occupation 2) List what devices and instruments are used to measure in their occupation 3) List what customary units are currently being used and what metric units would replace them. 4) List what associations or groups are sources of information about standards in their occupation. b) Present blank Table 2. Lead participants in thinking through, filling out Table. 1) Have each participant customize Table 2 for their occupation	Provide correct spellings and replacement units. Discuss possible ways of presenting Table 2 to a class. Call attention to the following: - Table 2 provides only selected examples of uses in the occupation - More or fewer metric units may be needed on the job. - Industry may decide to use a different metric unit as a standard practice.

PROCEDURE	COMMENT
c) Evaluation	Visual check of Table 1
d) Present Exercises 6 and 7 (15 minutes)	
1) Briefly show location of Exercises, explain purpose, teaching possibilities, adaptation	

OBJECTIVE	PROCEDURE	CONTENT
Each participant will develop a sample problem to illustrate metric-metric conversion in his/her occupation.	1. Review purpose and format of Unit 3 (3 minutes) a) Point out location of objectives, suggested Teaching Sequence, and the order of Information Sheets and Exercises. b) Explain that the group will complete two sections of the unit.	Remind participants that the metric system is a base ten decimal system like our money and they may want to review the decimal system with their students before completing this unit.
MATERIALS NEEDED Unit 3 of the V-T Package for the participant's particular occupation. Pencils Overhead visuals, projector and screen	2. Centimetres and millimetres (4 minutes) a) Present information Sheet 3 b) Have participants complete Exercise 8. c) Have participants check their answers on answer page. 3. Present Exercise 13 (8 minutes) a) Explain purpose of Exercise to show occupational conversions. b) Work one or two problems. Have participants check their answers. c) Have each participant write a sample problem they might show a class to illustrate metric-metric conversions. 4. Evaluation	Point out: change to smaller unit - multiply, move decimal point to right; change to a larger unit - divide, move decimal point to left. All exercises in this section follow same format. Example: a cook has ten litres of soup. Soup is served in 250 ml servings. How many servings can be obtained from 10 litres of soup? Oral check of participants' work; have some participants share their examples.

OBJECTIVE	PROCEDURE	COMMENT
The participants will develop a lesson plan to teach Unit 4.	1. Review purpose and format of Unit 4 (3 minutes)	
	a) Point out location of objectives Suggested Teaching Sequence, Information and Exercises.	Explain that BOE packages have different kinds of information and exercises.
MATERIALS NEEDED	b) Explain use of a resource table in student activities with both customary and metric tools.	Explain that many metric tools and devices are not yet available and standards have not been set. Both kinds of measurement tools and devices may be in use for a number of years. Some devices may have dual scales--metric and customary. Look carefully to be sure which scales or devices to use. Check to be sure which measurement system is called for in a task.
Unit 4 materials		
Pencils		
Paper		
466 Handout - "Suggested Lesson Plan"		
Display table of metric tools and devices	2. Examine Display Table (12 minutes)	
	a) Direct participants to examine the display table of metric tools and devices.	
	3. List tools and develop lesson plan (15 minutes)	
	a) Review format on handout "Suggested Lesson Plans".	Stress that the handouts are <u>only</u> suggestions.
	b) Individually or in small groups have the participants develop a lesson plan to teach the materials in Unit 4.	Remind participants of display table and purpose of the Exercises.
	4. Evaluation	Visual check lesson plan.

OBJECTIVE

Participants will identify situations where dual inventories will be used.

MATERIALS NEEDED

Materials from Unit 5

Pencils

Various size packages in metric and customary

1. Review format and purpose of Unit 5 (5 minutes)

- a) Point out location of objectives. Suggested Teaching Sequence, Information, and Exercises.

- b) Explain that conversion tables are for use in exercises and may not be exact enough for occupational tasks.

- c) Discuss ways of introducing the section in class, such as displaying different sized packages or objects. Show different sized objects.

2. Small group activity (10 minutes)

- a) Divide participants into small groups. Direct them to develop a list of situations where dual inventories might be used.

3. Evaluation

CONTENT

Unit designed to address situation of dual inventories.

Both systems will be in operation. Many conversions will not be exact but will be convenient fractions. Example: Milk and liquor

Oral Check: Call on each group to share their situations.

OBJECTIVE

The participants will identify workshop requirements.

The participants will describe effective workshop behaviors.

The participants will outline a basic inservice workshop plan for the V-T materials.

468

MATERIALS NEEDED

Handouts - Workshop guide and MEP Workshop Lesson Plans

Paper

Pencil

Blackboard/Overhead

PROCEDURE

1. Workshop Requirements (15 minutes)

- a) Small group discussion/panel discussion on what participants feel they would have to know to put on a workshop.
- b) Have groups present their lists - pool into master list.

Make list on board/overhead. After discussion, pass out handout.

2. Role play/describe Workshop Behaviors (30 Minutes)

- a) Have participants break into small groups and react to situation cards - role play or describe.

3. Workshop plan (15 minutes)

- a) Have participants individually or in small groups outline a workshop inservice plan to train teachers to use V-T materials.

Pass out copies of MEP workshop plan.

UFOV REGIONAL CONFERENCE
METRIC EDUCATION PROJECT

Implementation and Dissemination Strategies

Day 2

9:00-9:30	Film
9:30-10:30	Defining data for dissemination and implementation strategies
10:30-10:45	Coffee
10:45-12:30	Designing components of dissemination and implementation strategies

WORKSHOP SESSIONS

IMPLEMENTATION AND DISSEMINATION BENEFITS

OBJECTIVE

A dissemination and implementation strategy will be defined for each State

MATERIALS NEEDED

Innovations Evaluation Guide.

Paper

Pencils

List of techniques

PROCEDURE

1. Group together by State around tables.
2. Divide State into two groups
3. Group A will work on dissemination
Group B will work on implementation
4. Group A will evaluate BENEFITS.
Individual Pupil Growth, Program Operations, Society and the Economy, Credibility, and Assurances.

Group B will evaluate COSTS.
Funding
Time Considerations
Installation Considerations
Organizational Change
Personnel Needs
Space and Equipment Needs
5. Given the evaluation data derived from A and B, each group will design appropriate strategies.

COMMENT

Participants will group together by State to consider unique requirements of their own locales.

Those persons concerned with dissemination, such as labs and RCU's will work on the dissemination strategy.

Administrators and other concerned with implementation will design a strategy.

470

Examples of Dissemination/Implementation Strategies

1. Endorsing the innovation through a local professional organization.
2. Giving pay for participating in or with an innovation.
3. Soliciting the users' support for the decision to try the innovation.
4. Visiting a site which has installed the innovation.
5. Conducting a pilot test of the innovation.
6. Explaining the innovation to members of the community through conferences with the school staff.
7. Hiring additional persons to do the less challenging tasks associated with the innovation.
8. Endorsing the innovation through persons perceived as highly credible by the user.
9. Providing instructional materials for trying the innovation.
10. Conducting a strike to call attention to the need for the innovation.
11. Informing the general public through a newspaper article.
12. Promoting the innovation by emphasizing its positive characteristics.
13. Providing information about the innovation in a professional journal.
14. Providing released time to individuals to try the innovation.
15. Replacing a key person with a less resistant individual to speed up the acceptance of the innovation.
16. Providing information directly to the individual's supervisor if they resist the innovation.
17. Warning individuals of the consequences of their resistance.
18. Providing explicit instructions by the developer on how to use the innovation.
19. Giving recognition to the person for trying the innovation.
20. Exhorting the user to do a better job.
21. Asking persons similar to the user to support the innovation.
22. Suggesting that an individual could lose his job for criticizing the innovation.
23. Transferring an individual from one school to another.
24. Allowing the user to adapt the product to local conditions.
25. Selecting only the most interested potential users to try the innovation.

26. Observing the innovation in operation.
27. Providing cost and benefit data which evaluate the innovation to decision makers.
28. Observing the effectiveness of the innovation in the local setting.
29. Asking potential users to give their reasons for rejecting the innovation.
30. Enacting legislation which would legally insure the use of the innovation.
31. Discrediting the character of resistors to the innovation.
32. Conducting boycotts.
33. Suggesting to individuals that their association with the innovation would look good on their record.
34. Emphasizing characteristics of the innovation which are consistent with community values.
35. Asking persons respected by the user to present the innovation to the user.
36. Providing information on the prior success of the innovation.
37. Designating a person in the school building to put the innovation into practice.
38. Answering questions about the innovation at community service organization meetings.
39. Formation of a committee to facilitate two-way communication between the school and the community.
40. Trying the innovation on a small scale.
41. Raising the expectations of users for the outcomes to be achieved by the innovation.
42. Setting a time deadline for using the innovation.
43. Emphasizing those aspects of the innovation which are consistent with what the user expects.
44. Compelling individuals to use the innovation.
45. Enacting a resolution to incorporate the innovation into the users' prescribed activities.
46. Providing information about how the innovation has been used in other places.
47. Associating the name of the developer with the innovation.
48. Asking potential users to criticize the innovation.
49. Requiring persons in authority to endorse the innovation.
50. Present the innovation as unfinished to allow users to make it their own.

EVALUATION OF WORKSHOPS

Three types of evaluation will take place during the workshop. There will be an evaluation of the ABE objectives specified in the lesson plans for that part of the workshop. There will also be an evaluation of the vocational objectives specified in the workshop sessions description. In addition, there will be an overall evaluation of the workshop.

After each workshop, the findings of these evaluations will determine what changes, if any, may be needed for the next presentation. A summary of all findings will be submitted in the final report.

Copies of the dissemination and implementation components designed by the participants will be collected and reviewed. Findings will be used to clarify techniques for the next workshop if needed. A summary of this component will also be submitted in the final report.

The three types of evaluation forms follow.

VOCATIONAL-TECHNICAL WORKSHOP EVALUATION

Please take a few minutes to answer these questions. The information collected in this evaluation will help the workshop staff improve future workshops. Fill in the region at the top of the page but do not sign this form.

I. CONTENTS OF THE VOCATIONAL-TECHNICAL PACKAGES

Choose the correct letter to identify the contents of each of the following components of the packages.

- | | |
|--|--|
| 1. Teaching and Learning the Metric System | a. answers to student exercises and "Testing Metric Abilities" |
| 2. Unit 1 | b. background information and exercises on metric-metric equivalents |
| 3. Unit 2 | c. background information and exercises on selecting and using metric instruments, tools and devices |
| 4. Unit 3 | d. an overview of the contents of the package plus suggestions for using the instructional materials. |
| 5. Unit 4 | e. background information and hands-on exercises for a general introduction to metric measurement |
| 6. Unit 5 | f. test items to be used with each unit |
| 7. Testing Metric Abilities | g. selected annotated references of written materials, metric suppliers, and information sources. |
| 8. Answers to Exercises and Test | h. background information, conversion formulae and charts for metric-customary conversion |
| 9. Tools and Devices List | i. background information, tables, and exercises to introduce the metric units specific to an occupation |
| 10. References | j. a list of tools and devices used to set up resource tables and those metric tools and devices particular to an occupation |

11. METRIC KNOWLEDGE

Read each question carefully and circle the letter next to the correct answer.

1. The correct way to write 20 centimetres is:

[A] 20 cm
[B] 20 Cm
[C] 20cm
[D] 20 cm.

2. Estimate the length of the line segment below:

[A] 23 grams
[B] 6 centimetres
[C] 20 millimetres
[D] 14 pascals

3. A square metre is about the area of:

[A] this sheet of paper
[B] a card table top
[C] a bedspread
[D] a postage stamp

4. The mass of an adult will be measured in:

[A] centimetres
[B] kilopascals
[C] kilograms
[D] kilometres

5. 112 centimetres is the same as:

[A] 1120 metres
[B] 112 metres
[C] 11.2 metres
[D] 1.12 metres

6. 0.5 litre is the same as:

[A] 5000 ml
[B] 500 ml
[C] 50 ml
[D] 5 ml

7. Degrees Celsius are measured with a:

[A] thermometer
[B] scale
[C] ruler
[D] pressure gage

8. The replacement unit for the fluid ounce is the:

[A] millimetre
[B] kilopascal
[C] gram
[D] millilitre

Use this conversion table to answer questions 9. and 10.

g	oz.	g	oz.
100	3.53	10	0.35
200	7.05	20	0.71
300	10.58	30	1.06
400	14.11	40	1.41
500	17.64	50	1.76
600	21.16	60	2.12
700	24.70	70	2.47
800	28.22	80	2.92
900	31.75	90	3.17
1000	35.27		

9. 30 grams is equivalent to:

[A] 10.58 oz.
[B] 0.35 oz.
[C] 1.06 oz.
[D] 31.75 oz.

10. 150 grams is equivalent to:

[A] 5.29 oz.
[B] 3.53 oz.
[C] 17.99 oz.
[D] 1.76 oz.

ABE WORKSHOP EVALUATION

The information collected in this form will help the workshop staff evaluate several aspects of the workshop and improve future workshops. Please take a few minutes to answer these questions. Do not put your name on this evaluation.

I. Location of Materials

Give the book and page numbers where the following parts are found in the ABE materials. Use SW for Student Workbook, IG for Instructor's Guide, and AS for Audio Tape Script. For example, if something is on pages 7-9 of the Student Workbook, then you should write SW 7-9.

1. The "Design and Use of the Student Workbook" for Level I. _____
2. The "Objective" for the Level I section on Linear Measurement. _____
3. "The Teaching Sequence Can be....." for the Level I section on Linear Measurement. _____
4. The "Vocabulary" for the Level I section on Measurement of Weight. _____
5. A list of "Resources and Materials" for Level I. _____
6. A recipe "Millspread for Bread" for Level I. _____
7. The script for the section on Measurement of Capacity for Level I tapes. _____
8. A Level II section on kilograms which shows people "Using Metrics at Work and at Home". _____
9. The "Design and Use of the Student Workbook" for Level II. _____
10. An "Index of Occupations" in the Level II student materials. _____
11. Level III "Metric Activities" on Litres. _____
12. A list of "References" for Level III. _____
13. What the Level III instructor needs to know about "Metric Notation". _____



II. Metric Knowledge

This part has 13 questions. Read each question carefully. There are two kinds of questions. One type of question is a multiple-choice question. The other type of question asks you to fill in the blank. Write your answers in the spaces provided.

1. A centimetre is about _____.

- (1) the width of a fingernail.
- (2) the thickness of a dime.
- (3) the capacity of a spoon.
- (4) the length of this room.

2. A rock has a mass of 128 grams. Using metric symbols, this can also be written as 128 _____.

3. The width of this sheet of paper is _____ mm.

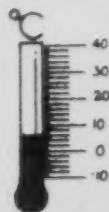
4. How much salt is in this spoon? _____



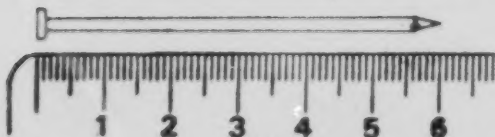
5. A measure that is the same as 52 ml is _____.

- (1) 52 000 litres
- (2) 5 200 litres
- (3) 0.052 litre
- (4) 0.52 litre

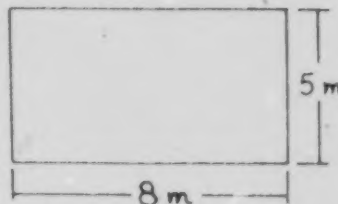
6. The temperature shown on this thermometer is _____.



7. This nail is _____ cm long.



8. The area of this rectangle is _____ m^2 .



9. A measure that is the same as 934 kilograms is _____.

- (1) 0.934 g
- (2) 934 000 g
- (3) 9.34 g
- (4) 93 400 g

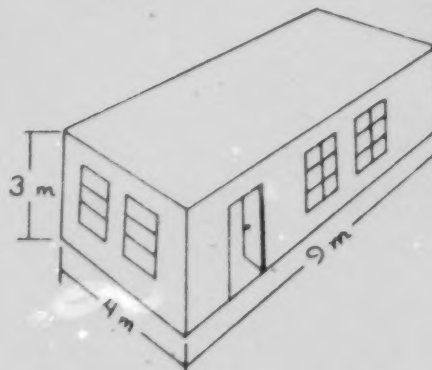
10. If you use the symbol for millilitres, 28 millilitres can be written as 28 _____.

11. If you use metric symbols, 13 cubic metres can also be written as 13 _____.

12. A square metre is about the size of _____.

- (1) a card table top.
- (2) your thumbnail.
- (3) the floor of the classroom.
- (4) a 25¢ coin (quarter).

13. The area of the floor of the house in this picture is _____.



Please indicate in
which program you
participated.
(Check one)

☐ ABE
☐ VT

City _____

Region _____

METRIC WORKSHOP EVALUATION

The information collected in this form will help the staff evaluate the quality of the metric workshops. The information will also be used to help improve future programs. Please take a few minutes to provide your feedback. All data will be held in strict confidence.

QUALITY RATING

	Excellent	Good	Average	Fair	Poor
1. Workshop Information	A	B	C	D	F
Comment:	_____				
2. Registration procedures	A	B	C	D	F
Comment:	_____				
3. Meeting rooms	A	B	C	D	F
Comment:	_____				
4. Overall Organization of the workshop	A	B	C	D	F
Comment:	_____				
5. Opening Comments	A	B	C	D	F
Comment:	_____				



6. Closing Comments A B C D F

Comment: _____

Note: Respond to items 7 to 14 in terms of the specific component (VT or ABE) you attended.

7. Content (usefulness, comprehensiveness, and clarity of the information presented) A B C D F

Comment: _____

8. Instruction (variety, sequence, A/V support, and time allotted to various instructional formats) A B C D F

Comment: _____

9. Instructors (preparation, effectiveness and responsiveness to participants' needs) A B C D F

Comment: _____

10. Printed instructional materials (usefulness during training and to take home) A B C D F

Comment: _____

11. Professional interaction with instructors and other participants on problems of personal interest A B C D F

Comment: _____

12. Session as a whole

A

B

C

D

E

Comment: _____

II. GENERAL INFORMATION

Circle the most appropriate response for each question. Please explain your answer in the space provided for comments.

13. How well did the session meet the expectations you had before you came?

1

2

3

4

Extremely Well

Adequately

Not at all

Comment: _____

14. How appropriate was the instruction for you?

1

2

3

4

5

a. Too Technical

Just Right

Too Elementary

1

2

3

4

5

b. Too Formal

Just Right

Too Informal

Comment: _____

III. RECOMMENDATIONS

15. What specific suggestions would you make for improving future work hours in metric education?

Thank you!



FOLLOW-UP ACTIVITIES

Both State Education Agencies and Local Education Agencies budget and plan educational programs some eight to twelve months ahead of implementation, since budgets for expenditures must be approved by state legislatures and local boards of education in the fiscal year previous to onset. In the case of LEA's, many must have Board approval for new curricula, as well. Therefore, it is unrealistic to assume that workshop participants would be in a position to implement use of the metric materials before fiscal year 1977-78. Since the workshops are being conducted in the early part of 1977, the best that may happen within the states is that planning for implementation will take place before June 30, 1977.

The follow-up activities to be provided by project staff before project termination most likely will be in response to requests for help in planning rather than implementing.

At each workshop participants will be informed that follow-up assistance will be available to them by mail until June 20, 1977, if further help is needed. If requests become numerous, a format of responses will be developed to provide help in a cost-effective and timely manner. We anticipate providing a four day turn-around-time on requests since project staff will be out in the field three days a week conducting the workshops.

APPENDIX VIII-B

In-service Workshop Schedule

METRIC WORKSHOPS

HOTEL AND WORKSHOP ACCOMMODATIONS

City & Dates	Hotel Accommodations	Workshop Location
San Francisco March 7-8	Holiday Inn Civic Center 50 Eighth Street San Francisco, Calif. 94103 Contact: Mr. Ainsley (415) 626-6103	Same
New York, N. Y. March 14-15	Statler-Hilton 33rd and 7th Ave New York, NY 10001 (212) 736-5000	City University Graduate School Room 1700 33 W. 42nd Street New York, NY 10036 Contact: Dr. Leon Cohen Director (212) 221-3895
Philadelphia March 17-18	Philadelphia Hilton Inn 10th at Packer Ave Philadelphia, Pa. 19148 Contact: Jack Quigley (215) 755-9500	Same
Boston March 23-24	Holiday Inn 332 Milliken Blvd. Fall River, Mass 02722 (617) 676-1991	Bristol Community College Room 111, Building C Ellsbree Street Campus Fall River, Mass 02720 Contact: Mrs. Mary Fitton (617) 678-2811
Denver March 29-30	Cosmopolitan Hotel 1780 Broadway Denver, Colorado 80202 Contact: Pat Hockett (303) 623-2181	Same
Chicago April 5-6	Bismark Hotel 171 W. Randolph Street Chicago, Ill 60601 Contact: Charles Grandberg (312) 236-0123	Same

Hotel Accommodations Cont.

City & Dates	Hotel Accommodations	Workshop Location
Seattle April 12-13	Olympic Hotel 416 Seneca Seattle, Washington 98101 (206) 682-7700	New Federal Building Room 390 915 Second Avenue Seattle, Wash 98101 Contact: Bob Workman (206) 442-0456
Atlanta April 19-20	Sheraton-Biltmore Hotel 817 W. Peachtree St. N.E. Atlanta, Ga 30383 Contact: Jane Smith-Buckman (404) 881-9500	Same
Dallas April 26-27	Royal Coach Inn 3800 W. Northwest Highway Dallas, Tx 75220 Contact: Kenna Balch (214) 357-9561	Same
Kansas City, Mo May 3-4	Continental Hotel 106 W. 11th Kansas City, Mo 64105 Contact: Eva Gatrel (816) 421-6040	Same

APPENDIX VIII-C

In-Service Workshop Participant Lists

REGION I METRIC WORKSHOP
ATTENDEE LIST

State of Connecticut

	<u>AREA</u>
1. Atwood, Beth A. Center for Adult Basic Education Staff Development Project 38 Woodland St. Hartford, CT 06105	ABE
2. Cropper, Margaret E. Vernon Adult Education Center (Day Div.) c/o Rockville High School Rockville, CT 06066	ABE
3. Garoppolo, John T. Manchester High School Manchester, CT 06040	V-T
4. Girard, Mary Ann Adult Learning Center Main St. Derby, CT 06418	ABE
5. Salerno, Charles A. Connecticut State Dept. of Education Vocational Div., Rm. 338 P.O. Box 2219 Hartford, CT 06115	V-T
6. Shia, Edward S. Consultant, T & I State Office Bldg. Hartford, CT 06115	V-T
7. Sullivan, Frank Manchester High School Manchester, CT 06040	V-T

REGION I METRIC WORKSHOP
ATTENDEE LIST

State of Maine,

	<u>AREA</u>
1. Knight, Richard M. Bureau of Vocational Education Augusta, ME 04333	V-T
2. Marchildon, Donald V. Bureau of Vocational Education Dept. of Educational & Cultural Services Education Bldg. Augusta, ME 04333	V-T
3. Wheeler, Thomas J. Dept. of Educational & Cultural Services Bureau of Vocational Education Augusta, ME 04333	V-T
4. Woodward, James Waterville Adult Education Program Waterville High School Waterville, ME 04901	ABE
5. Goodwin, Julia RFD Raymond Hill Rd. Raymond, ME 04071	ABE

REGION I METRIC WORKSHOP
ATTENDEE LIST

State of Massachusetts

	<u>Area</u>
1. Carbone, Paul L. CMREC Rt. 140 (Beaman St.) W. Boylston, MA 01583	V-T
2. Evanson, Jane Director of Adult Education Worcester State College 18 Chicopee St. Worcester, MA 01602	ABE
3. Farrington, William E. Springfield Regional Education Center 2083 Roosevelt Ave. Springfield, MA 01104	
4. Knox, Ghernot L. 1551 Osgood St. No. Andover, MA 01815	V-T
5. Lemay, Ronald Adult Learning Center 014 Worcester Center Worcester, MA 01608	ABE
6. Murray, Arthur E. Greater Boston Regional Ed Center 54 Rindge Ave. Ext. Cambridge, MA 02140	ABE
7. Perfetto, Robert J. North Attleboro High School Landry Ave. North Attleboro, MA 02760	ABE
8. Poskosh, Geri Mass. Dept. of Education Div. of Occupation Ed. 182 Tremont St. Boston, MA 02111	V-T
9. Reed, Clifton E. 54 Rindge Ave. Extension Cambridge, MA 02140	V-T
10. Sedar, Martin Southeast Regional Education Center P.O. Box 29 Middleboro, MA 02346	V-T

	<u>AREA</u>
11. Tamarkin, Kenneth A. 156 Highland Ave. Somerville, MA 02143	ABE
12. Terceiro, Edward R., Jr. Diman Technical Institute Stonehaven Rd. Fall River, MA 02723	V-T
13. Towey, Dr. Carroll U.S. Office of Education John F. Kennedy Federal Bldg. Boston, MA 02203	ABE
14. Winer, Dr. Ellen Northeastern University 202 Stearns Hall Boston, MA 02115	V-T

REGION I METRIC WORKSHOP
ATTENDEE LIST

State of New Hampshire

	<u>AREA</u>
1. Archambault, Betty-Lou Merrimack High School Merrimack, NH 03054	V-T
2. Barrett, Evelyn C. McElwain St. Merrimack, NH 03054	V-T
3. Hurst, James C. Somersworth High School Somersworth, NH 03878	V-T
4. Joyce, William L. Groveton High School Groveton, NH 03582	V-T
5. Skinner, William R. O'Connell House University of New Hampshire Durham, NH 03824	V-T
6. Thomas, Dr. Gerald L. Cheshire House Keene State College Keene, NH 03431	V-T

REGION I METRIC WORKSHOP
ATTENDEE LIST

State of Rhode Island

	<u>AREA</u>
1. Couto, Barry D. Davies Voc-Tech School Jenckes Hill Rd. Lincoln, RI 02865	V-T
2. Crowley, Joseph H. Coventry Voc. Tech Facility Foster Dr. Coventry, RI 02816	V-T
3. Hainey, Sister Mary Andrew 396 Smith St. Providence, RI 02908	ABE
4. Jones, Edward E. Jr. Adult Education, Rodman Hall University of Rhode Island Kingston, RI 02881	V-T
5. O'Shea, James Patrick Rhode Island College Providence, RI 02908	V-T

REGION I METRIC WORKSHOP
ATTENDEE LIST

State of Vermont

1. Higgins, Richard
Chairman, Metric Education Committee
State Dept. of Education
Montpelier, VT 05602

NEW YORK WORKSHOP
ABE ATTENDEE LIST
State of New Jersey

1. Barasch, Seymour
Adult Education Resource Center
Kean College of New Jersey
Union, NJ 07083
2. Berg, Joann
Adult Education Dept.
Montclair State College
Upper Montclair, NJ 07043
3. Carrea, Natalino
Bound Brook-S. Bound Brook
Hillsborough Adult School
West Union Ave.
Bound Brook, NJ 08805
4. Ciccariello, Bruno
Adult Basic Education Office
Division of Field Services
3535 Quakerbridge Rd.
Trenton, NJ 08619
5. DiUbaldo, Anthony
2 Cedar St.
Newark, N.J.
6. Hitt, Richard
Bureau of Adult, Continuing
and Community Education,
3535 Quakerbridge Rd.
Trenton, NJ 08619
7. Joplin, Joan
Bureau of Adult Continuing Com-
munity Education,
3535 Quakerbridge Rd.
Trenton, NJ 08619
8. Lanzano, Susan C.
Adult Education Resource Center
Jersey City State College
Jersey City, NJ 07305
9. Medaska, Ken
45 Smith St.
Paterson, NJ 07505
10. VanHouten, Harry
Adult Education Resource Center
Trenton State College
Pennington Rd.
Trenton, NJ 08625
11. Wallace, Dr. Milton
Passaic Adult Learning Center
657 Main Ave.
Passaic, NJ 07055

NEW YORK WORKSHOP
V-T ATTENDEE LIST
State of New Jersey

1. Bach, Dr. Irving E.
Rutgers Graduate School of Ed.
New Brunswick, NJ 08903
2. Berman, Barbara
Rutgers University
G.S.E.
10 Seminary Pl.
New Brunswick, NJ 08903
3. Brecheisen, Karl W.
Roxbury Township Schools
25 Meeker St.
Succasunna, NJ 07876
4. Bugay, Mrs. Stephanie
178 Barracks St.
Perth Amboy, NJ 08861
5. Cummings, Dr. John
Dept. of Education
225 W. State St.
Trenton, NJ 08625
6. Edgecomb, Dr. Philip L.
Associate Director
Vocational Curriculum Lab
4103 Kilmer Campus
Rutgers University
New Brunswick, NJ 08903
7. Friederwitzer, F.
Rutgers University
G.S.E.
10 Seminary Pl.
New Brunswick, NJ 08903
8. Frobose, Denise
Rutgers University, Bldg. 4103
Kilmer Campus
New Brunswick, NJ 08903
9. Kelly, Dr. Joseph F.
New Jersey Dept. of Education
225 W. State St.
Trenton, NJ 08625
10. Shellhammer, Russell N.
North Bridge St.
Bridgewater, NJ 08807
11. Snyder, Dr. Vance B.
Industrial Studies Dept.
Kean College of New Jersey
Union, NJ 07083
12. Sternberg, Dr. Albert
Rider College
Lawrenceville, NJ 08648
13. VanBenschoten, Dr. R. D.
Montclair State College
Valley Road
Upper Montclair, NJ 07043
14. VanGulik, Richard
New Jersey Dept. of Education
Division of Vocational Education
225 W. State St.
Trenton, NJ 08625

NEW YORK WORKSHOP
V-T ATTENDEE LIST
State of New York

1. Borelli, Michael L.
Cortland-Madison BOCES
Clinton Ave. Ext.
Cortland, NY 13045
2. Conover, Hobart
New York State Education Dept.
99 Washington Ave.
Albany, NY 12230
3. Etu, Mary Ann
99 Washington Ave.
Twin Towers, Rm 1621
Albany, NY 12230
4. Friedman, Nathan L.
Bureau of Industrial Arts
131 Livingston St.
Brooklyn, NY 11201
5. Gold, Dr. Faye
NYC Board of Education -
Business & Distributive Ed
131 Livingston St.
Brooklyn, NY 11201
6. Grande, Gerard
100 Luten Ave.
Staten Island, NY 10312
7. Hay, G. Earl
Chief, Bur. Occupational Education
Curriculum Development
State Education Dept.
Albany, NY 12234
8. Kresse, Richard
Nassau Boles
1196 Prospect Ave.
Westbury, NY 11590
9. Lauter, Victor
NYC Community College
300 Jay St.
Brooklyn, NY 11201
10. Mausbach, Joel I.
Regional Center for Vocational Teacher Ed
11 W. 42nd st.
New York, NY 10036
11. Ostler, Dr. Ruth-Ellen
Chief, Bureau of Health Occ. Ed.
NYSED, 99 Washington Ave.
Albany, NY 12230
12. Penrose, Joan Borum
New York Institute of Technology
13. Savoury, Clinton
Old Rt. 6
Carmel, NY
14. Watnick, Norman E.
Assistant Director
131 Livingston St.
Brooklyn, NY 11201

NEW YORK WORKSHOP
 ABE ATTENDEE LIST
 State of New York

1. Baillargeon, Jarvis H.
 Associate
 New York State Education Dept.
 99 Washington Ave.
 Albany, NY 12230
2. Burger, Donald K.
 Adult Learning Center
 222 S. Pearl St.
 Albany, NY 12202
3. Dozier, Oare
 School of Education
 Instructional Design Center
 Klapper, 108
 CCNY
 35th St. & Convent Ave.
 New York, NY 10031
4. Gies, Eunice C.
 Adult Learning Center
 222 S. Pearl St.
 Albany, NY 12202
5. Horowitz, Morton S.
 Oceanside Senior High School
 Brower & Skillman Aves.
 Oceanside, NY 11572
6. Johnson, Harvey
 Division of Continuing Education
 New York State Education Dept.
 Albany, NY 12234
7. Kryman, Frederick J.
 Suny Ag-Tech College
 Alfred, NY 14803
8. Postmentier, Alfred
9. Serrao, A.
 Supervisor, Adult Basic Education
 Rochambeau School
 White Plains, NY 10606
10. Tan, Sinforosa
 Bronx Community College
 2468 Jerome Ave.
 Bronx, NY 10468
11. Torbitt, Gregory T.
 World of Work
 75 South St.
 Rochester, NY
- 12.

NEW YORK WORKSHOP
ATTENDEE LIST
Territorial Possessions

Puerto Rico

1. Gines, Hector L.
Department of Education
Work-Study Program
P.O. Box 759
Hato Rey, Puerto Rico 00919
ABE Participant
2. Perez, Waldemar
Div. of Community Education
Department of Education
Box 432
San Juan, P.R. 00902
V-T Participant

Virgin Islands - ABE Participants

1. Berne, Alphonse
Department of Education
P.O. Box 630
Charlotte Amalie, St. Thomas, V.I. 00801
2. Connor, Anna L.
Department of Education
P.O. Box 630
Charlotte Amalie, St. Thomas, VI. 00801
3. Farrow, Carver
Department of Education
P.O. Box 630
Charlotte Amalie, St. Thomas, V.I. 00801
4. Gawrych, Gloria Encarnacion
Adult Education St. Croix Central High
P.O. Box 1550
Kingshill, St. Croix, V.I. 00850
5. Seales, Tyrone
Elena Christian Jr. High
Dept. of Bd. C'sted.
St. Croix, V.I.
6. Treasure, Melrose A. (Mrs.)
Box 2766
Christiansted
St. Croix, V.I.

PHILADELPHIA WORKSHOP
ATTENDEE LIST
State of Delaware

V-T ATTENDEES

1. Ignatowski, Stanley
Hodgson Vo-Tech
Glasgow, DE
2. Ilyas, Dr. Mohammad
Goldey Beacom College
Wilmington, DE 19808
3. Matz, William M.
Sussex Voc-Tech Center
P.O. Box 351
Georgetown, DE
4. Rabel, Edward T.
Goldey Beacom College
Limestone Rd.
Wilmington, DE
5. Snyder, Thomas J.
Delcastle Technical High School
1417 Newport Rd.
Wilmington, DE 19804
6. Van Sciver, Donald
Delcastle Technical High School
1417 Newport Rd.
Wilmington, DE 19804
7. Williams, Robert F.
Paul Hodgson Voc-Tech.
Newark School District
Newark, DE 19702

ABE ATTENDEE

1. Brooks, Elva M.
Howard High School
13th & Poplar Sts.
Wilmington, DE

PHILADELPHIA WORKSHOP
ATTENDEE LIST
District of Columbia

1. Brewer, Raymond M.
Adult Education Demonstration Center
13th & K N.W.
Washington, D. C.
2. Etheridge, Bessie D.
415 - 12th St., N.W., Rm. 903
Washington, D.C. 20004
3. Hugi, Myrna G.
U.S. Office of Education
Washington, D.C.
4. Maedel, Ouida V.
415 - 12th St., N.W., Suite 900
Washington, D.C. 20004
5. Silverman, Sol M.
Phelps Voc. School 24th & Benning Rd., N.E.
Washington, DC 20002
6. Smith, Marlene A.
Chamberlain Vocational High School
14th & Potmac Ave., S.E.
Washington, D.C. 20003
7. Thompson, Calvin
Office & Business Education
10th & Monroe Sts., N.E.
Washington, DC 20017

PHILADELPHIA WORKSHOP
V-T ATTENDEE LIST

State of Maryland

1. Basaman, Joseph P.
Prince George's Community College
301 Largo Rd.
Largo, MD 20870
2. Brewrink, Robert
Prince George's County Public Schools
Instructional Services Center
Upper Marlboro, MD 30870
3. Fitzgerald, Bob
Box 189
Westover, MD 21871
4. Myers, Allan B.
P.O. Box 8717
BWI Airport
Baltimore, MD 21240
5. Pluemer, Raymond G.
Eastern Voc-Tech High School
1100 Mace Ave.
Baltimore, MD 21221
6. Reiley, H. Edward
Board of Education of Frederick County
115 E. Church St.
Frederick, MD 21798
7. Sargent, K. R.
Maryland State Dept. of Ed.
B.W.I. Airport
Baltimore, MD 21240
8. Sheriff, Seth R., Jr.
North East Middle School
Cecil Ave.
North East, MD 21901

ABE ATTENDEE

1. Murphy, Dorothy
Adult Education
Calvert & 23rd Sts.
Baltimore, MD 21218

PHILADELPHIA WORKSHOP
V-T ATTENDEE LIST

State of Pennsylvania

1. Curtis, Carroll A.
Pennsylvania Dept. of Education
Box 911
Harrisburg, PA 17126
2. Dittenhafer, Clarence A.
Vocational Education Dept.
Temple University
Philadelphia, PA
3. Grisham, Jack R.
U.S. Office of Education
3535 Market St.
Philadelphia, PA
4. Klinger, Robert
Sixth & Olive Sts.
Media, PA
5. Lewis, James P.
Pennsylvania Dept. of Education
Box 911
Harrisburg, PA 17126
6. Love, Leah J.
2814 Walbert Ave.
Allentown, PA 18104
7. Mohn, LeRoy W.
CMC AVTS
Norristown, PA
8. Swaincott, Helen K.
2814 Walbert Ave.
Allentown, PA 18104
9. Werner, Evelyn
VEIN, Stayer R & L Center
Millersville State College
Millersville, PA 17551
10. Zimmerman, Earl R.
Pa. Dept. of Education
Box 911
Harrisburg, PA 17126

PHILADELPHIA WORKSHOP
ABE ATTENDEE LIST

State of Pennsylvania

1. Jones, Gordon
Box 911
Harrisburg, PA 17126
2. Lopez, Edward
Pennsylvania Dept. of Ed.
Box 911
Harrisburg, PA 17126
3. Monaco, Linda Jeanne
Pa. Dept. of Ed.
Division of Adult & Community Ed
Box 911
Harrisburg, PA 17126

PHILADELPHIA WORKSHOP
ABE ATTENDEE LIST

State of West Virginia

1. Davis, Barbara A.
1511 Blizzard Dr.
Parkersburg, WV 26101
2. Harris, Mary R.
Federal Correctional Institution
Alderson, WV 24910
3. Quesenberry, Terry L.
Adult Learning Center
Welch, WV 24801
4. Rothwell, Edna R.
Barboursville Adult Learning Center
Barboursville, WV 25504

V-T ATTENDEE LIST

1. Culnon, George D.
W. Va. Institute of Technology
Montgomery, WV 25136
2. McNutt, Joseph D.
Federal Correctional Institution
Alderson, WV 24910
3. Rosebrook, James B.
Capitol Complex Bldg 6, Rm. B237
1900 Washington St., E.
Charleston, WV 25305

PHILADELPHIA WORKSHOP
ATTENDEE LIST
State of Virginia

ABE

1. Browder, Jerry D.
2100 Idlewood Ave.
Richmond, VA 23234
2. Byrd, Dr. Phyllis
719 Church St.
Lynchburg, VA 24502
3. Wright, Stacy
Adult Learning Center
701 Broad St.
Danville, VA 24541

ATTENDEE LIST
Metric Education Workshop
Region IV - Atlanta

State of Alabama

V-T ATTENDEES

1. Ashmore, Billie R.
Box 2847
University, AL 35486
2. Barber, Anita
Career Education Section
State Dept. of Education
607 State Office Bldg.
Montgomery, AL 36130
3. Bedwell, Dr. Norman W.
Box 6243
University, AL 35486
4. Coupland, Joe
P.O. Drawer 10007
Birmingham, AL 35202
5. Hollis, J. C.
824 State Office Bldg..
Montgomery, AL 36130
6. Lindley, J. C.
State Dept. of Education
Montgomery, AL 36130
7. McLaney, Patricia H.
Jr. College Section
Rm. 546 State Office Bldg.
Montgomery, AL 36130
8. Smith, Sue
Rm. 803 State Office Bldg.
Montgomery, AL 36130
9. Terry, Thomas P.
5028 Haley Center
Auburn University
Auburn, AL 36830
10. Yelverton, Sandra
State Dept. of Education
820 State Office Bldg.
Montgomery, AL 36130

ABE ATTENDEES

1. Castelli, Shirley E.
Adult Learning Center
2627 Hall Ave.
Huntsville, AL 35805
2. Lackey, Voncile T.
P.O. Box 1327
Mobile, AL 36601
3. Wier, J. B.
Pickens County Bd. of Education,
P.O. Box 32
Carrollton, AL 35447

ATTENDEE LIST
Metric Education Workshop
Region IV - Atlanta

State of Florida

V-T ATTENDEES

1. Barkley, Joseph R.
Florida Dept. of Education
J & B Bldg.
226 W. Jefferson St.
Tallahassee, FL 32304
2. Brookhouser, Don
Pan American Bank Bldg., Suite 309
315 E. Bird St.
Tampa, FL 33604
3. Ford, Dr. Clinita A.
Florida A & M University
Box A 84
Tallahassee, FL 32303
4. Gildan, Dr. Kathleen Y.
Florida Atlantic University
Boca Raton, FL 33431
5. Hogan, Hazel L.
Health Occupations - College of Education
Florida Technological University
P.O. Box 25000
Orlando, FL 32816
6. Irvine, Dr. Freeman R., Jr.
Florida A & M University
Box 433
Tallahassee, FL 32307
7. McGhee, Dr. Max B.
Dept. of Ag & Extension Education
University of Florida
305 Rolfs Hall
Gainesville, FL 32611
8. Ray, Dr. Richard
Health Occupation & Public Service
Dept. of Education, Knott Bldg.
Tallahassee, FL 32304
9. Singletary, James W. (Code N-5111)
Chief of Naval Education & Training
Pensacola, FL 32508

10. Steeb, Dr. Ralph V.
Consultant, Industrial Arts
State Dept. of Education
Tallahassee, FL 32304
11. Whitman, Betsey S.
Florida A & M University
P.O. Box #183
Tallahassee, FL 32307

ABE ATTENDEES

1. Atwood, Ron
410 Woods Ave.
Orlando, FL 32805
2. Froman, Ron
410 Woods Ave.
Orlando, FL 32805
3. Lamb, C. W.
Adult Education & Community Ser.
Florida Dept. of Education
Knott Bldg.
Tallahassee, FL 32304
4. Roberts, William W.
Dept. of Education
Center Bldg., Suite 280
Tallahassee, FL 32304
5. Watkins, Dr. Lloyd G.
Adult Education
Florida Jr. College, North Campus
Jacksonville, FL 32218

ATTENDEE LIST
Metric Education Workshop
Region IV - Atlanta

State of Georgia

V-T ATTENDEES

1. Adams, Dr. Margrett L.
Dept. of Secretarial Admin. &
Business Education
Valdosta State College
VSC Box 189
Valdosta, GA 31601
2. Smith, Pat
Vocational & Career Dev.
Georgia State University
Box 72
Atlanta, GA 30303
3. Snodgrass, Donald H.
Asst. Regional Commissioner
U.S. Office of Education
50 Seventh St., N.E., Rm. 550
Atlanta, GA 30323
4. Wilder, Issac
Metric Liason
U.S. Office of Education
50 Seventh St., N. E.
Atlanta, GA 30323
5. Yarborough, Cecil
Regional Commissioner
Office of Education, Rm. 549
50 Seventh St., N.E.
Atlanta, GA 30323

ABE ATTENDEES

1. Freeman, Ted B.
Senior Program Officer
Adult Education Programs
U.S. Office of Education
50 Seventh St., N.E., Rm. 555
Atlanta, GA 30323
2. Laws, Herb
c/o Community Friendship
85 Meritts St.
Atlanta, GA 30345
3. Parken, Estelle
1688 Broad St.
Augusta, GA 30904

ATTENDEE LIST
Metric Education Workshop
Region IV - Atlanta

State of Kentucky

V-T ATTENDEES

1. Baugh, Ron
Industrial Education Unit
Capital Plaza Towers
Frankfort, KY 40601
2. Gillespie, Wilma B.
Dept. of Vocational Education
205 Otter Hall
University of Louisville
Louisville, KY 40208
3. Lorenz, Doug
2109 Capital Plaza Tower
Frankfort, KY 40601

ABE ATTENDEES

1. Aiken, William, Dir. Vocational Ed
Jefferson County
2442 Preston Highway
Louisville, KY 40213
2. Back, William D.
Dept. of Education
Capital Plaza Tower
Frankfort, KY 40601
3. Bailey, C. J.
Dept. of Adult Counselling & Higher Ed.
U.P.O. 1353
Morehead State University
Morehead, KY 40351
4. Baker, Harry A.
22nd Floor
Capital Plaza Tower
Frankfort, KY 40601
5. Deichert, Karen
22nd Floor
Capital Plaza Tower
Frankfort, KY 40601
6. Moore, Lawrence H.
Center for Continuing Education
Murray State University
Murray, KY 42071
7. Stubbs, Harlan
State Dept. of Education
Capital Plaza Tower
Frankfort, KY 40601

ATTENDEE LIST
Metric Education Workshop
Region IV - Atlanta

State of North Carolina

V-T ATTENDEES

1. Caldwell, Bernice T.
Garinger High School
1100 Eastway Dr.
Charlotte, NC 28205
2. Carraway, Barbara J.
Dept. of Public Instruction
Div. of Occupational Ed.
Education Building, Rm. 550
Raleigh, NC 27611
3. French, Rick
Education Bldg., Rm. 565
Raleigh, NC 27611
4. Palmer, William F.
Education Dept.
Catawba College
Salisbury, NC 28144
5. Turner, William R.
North Brunswick High
Leland, NC 28451
6. Unrath, Marjory Cooper
Home Economics Education
Dept. of Public Instruction
Raleigh, NC 27611
7. Wilson, Sybille
Education Bldg., Rm. 526
Raleigh, NC 27611

ABE ATTENDEE

1. Leslie, Monica
N. C. Metric Resource Center
Dept. of Public Instruction
Raleigh, NC 27611

ATTENDEE LIST
Metric Education Workshop
Region IV - Atlanta

State of South Carolina

V-T ATTENDEES

1. Castro, Dr. W. E.
Mechanical Engineering Dept.
Clemson University
Clemson, SC 29631
2. Dixon, Dr. Marvin W.
Mechanical Engineering Dept.
Clemson University
Clemson, SC 29631
3. Jensen, Arthur K.
Vocational Education Media Center
Clemson University
Clemson, SC 29631
4. Lykes, John W.
Trade & Industrial Education
117½ N. Main St.
Anderson, SC 29621
5. Newton, Dr. Alfred F.
106 Freeman Hall
Clemson University
Clemson, SC 29631

ABE ATTENDEES

1. Eagle, Earle H.
Rm. 119 Robinson Bldg.
Lex. Drive
W. Columbia, SC 29169
2. Kelly, Joel T.
Office of Adult Education
State Dept. of Education
Rutledge Bldg.
Columbia, SC 29201

State of Tennessee

V-T ATTENDEE

1. Schroer, Franklin
Vocational Division
Memphis City Schools
2597 Avery Ave.
Memphis, TN 38112

CHICAGO WORKSHOP
ATTENDEE LIST

State of Illinois

V-T ATTENDEES

1. Behling, John
326 W. Jefferson
Rockford, IL 61101
2. Bowen, Ellen
Coronet Instructional Media
65 E. South Water St.
Chicago, IL 60601
3. Beenenga, Gene
100 N. First St.
Springfield, IL 62777
4. Chase, Paul J.
Dept. of Voc. & Career Ed Prog. Planning
Chicago Board of Education
228 N. LaSalle, Rm. 634
Chicago, IL 60601
5. Douglass, Rebecca
100 North First St. (E-426)
Springfield, IL 62703
6. Edwards, Homer
U.S. Office of Education
300 S. Wacker Dr.
Chicago, IL 60606
7. Etlinger, Dr. Leonard E.
C. & I. Dept.
Chicago State University
95th & King Dr.
Chicago, Ill. 60628
8. Jacobs, Phyllis Ann
Hoffman Estates High School
1100 W. Higgins
Hoffman Estates, IL 60172
9. McCage, Ronald D.
State Board of Education
100 North First St.
Springfield, IL 62777
10. Meeks, Wendell
Illinois Office of Education
100 N. First St.
Springfield, IL 62777

CHICAGO WORKSHOP
ATTENDEE LIST

State of Illinois

V-T ATTENDEES

11. Nichols, Dean
Illinois Office of Education
100 N. First St.
Springfield, IL 62777
12. Nusinow, Mindy
New Trier East High School
385 Winnetka Ave.
Winnetka, IL 60093
13. Santini, Alan
Davea Center
301 N. Swift Rd.
Addison, IL 60101
14. Schultz, Eldon, Sr. Program Officer
U.S. Office of Education
300 S. Wacker, Dr., 32nd Fl.
Chicago, IL 60606
15. Star, Emanuel, M.
Prosser Vocational High School
2148 N. Long Ave.
Chicago, IL 60639
16. Summers, Lorraine
State Board of Education
100 N. First St.
Springfield, IL 62777
17. Versemann, Wilbert E.
Venice-Lincoln Technical Center
S. 4th St.
Venice, IL 62090

CHICAGO WORKSHOP
ATTENDEE LIST

State of Wisconsin

V-T ATTENDEES

1. Aiken, Neil E.
Gateway Technical Institute
3520 - 30th Ave.
Kenosha, WI 53140
2. Byfield, Judith S.
126 Langdon St.
Madison, WI 53702
3. Ebben, Ron
1000 Schofield Ave.
Wausau, WI 54401
4. Johnson, Robert G.
Wisc. Bd. of Voc., Tech. & Adult Ed.
7th Floor
4802 Sheboygan Ave.
Madison, WI 53702
5. Zenor, Clifford
Wisc. Bd. of Voc. Tech & Adult Ed.
7th Floor
4802 Sheboygan Ave.
Madison, WI 53702

ABE ATTENDEES

1. Dolezar, Dennis
Waukesha County Technical Institute
332 W. Broadway
Waukesha, WI 53186
2. Durnin, Eileen A.
Milwaukee Area Technical College
1015 N. 6th St.
Milwaukee, WI 53203
3. Mehren, Arthur K.
Western Wisconsin Technical Institute
7th & Vine, Kumm Bldg.
La Crosse, Wisc. 54601
4. Smeltzer, Preston
(No address given)

CHICAGO WORKSHOP
ATTENDEE LIST

State of Ohio

V-T ATTENDEES

1. Kister, Joanna
Vocational Home Economics - 912
Ohio Dept. of Education
65 S. Front St.
Columbus, Ohio 43215
2. Ridenour, Harlan E.
Ohio Agricultural Education
Curriculum Materials Service
2120 Fyffe Rd., Rm. 254
Columbus, Ohio 43210
3. Stanley, Kathy S.
Greene Vocational School
2960 W. Enon Rd.
Xenia, Ohio 45385

ABE ATTENDEES

1. Deibel, Roger
Education Dept.
N. Grove & W. College
Otterbein College
Westerville, Ohio 43081
2. Love, Thomas E.
McKinley Sr. High School
Canton, Ohio 44702
3. Sensel, Larry G.
2064 Stearns Rd.
Cleveland, OH 44106
4. Wolters, Catherine C.
McMillan Adult Center
608 E. McMillan
Cincinnati, OH 45206

CHICAGO WORKSHOP
ATTENDEE LIST

State of Minnesota

V-T ATTENDEES

1. Gordon, Fred
Capitol Square Bldg.
St. Paul, MN 55101
2. Slamkowski, Edward
Minnesota Instructional Materials Center
3554 Whitebear Ave.
Whitebear Lake, MN 55110

ABE ATTENDEES

1. Gruis, Wayne K.
St. Paul Schools
1619 Dayton
St. Paul, MN 55104
2. Ploetz, Greta N.
Minneapolis Public Schools
300 S.E. Fifth St.
Minneapolis, MN 55805
3. Welsh, M. Eileen
Box 55
Stillwater, MN 55082

CHICAGO WORKSHOP
ATTENDEE LIST

State of Michigan

V-T ATTENDEES

1. Briggs, Gerald
Box 30009
Lansing, MI 48909
2. Lang, Ralph
Pontiac Continuing Education
25 S. Sanford St.
Pontiac, MI 48058
3. Letwin, Linda
Dept. of Education
Box 30009
Lansing, MI 48909
4. Yack, Thomas
646 N. Wayne Rd.
Westland, MI 48185

ABE ATTENDEES

1. Cooper, Lucinda
Adult Basic Education
500 W. Lenawee
Lansing, MI 48933
2. Mittag, Mae
Michigan Dept. of Education
Box 30008
Lansing, MI 48909
3. Savage, Kathleen
Wayne-Westland Schools
646 N. Wayne Rd.
Westland, MI 48185
4. Scott, Wayne R.
Department of Education
P.O. Box 30008
Lansing, MI 48909

CHICAGO WORKSHOP
ATTENDEE LIST

State of Indiana

V-T ATTENDEES

1. Powers, Kim
Indiana Dept. of Education
120 W. Market St., 16th Fl.
Indianapolis, IN 46204
2. Wampler, DeAnna
Indiana Curriculum Materials Center
Technology Annex West
Indiana State University
Terre Haute, IN 47809

CHICAGO WORKSHOP
ATTENDEE LIST

State of Illinois

ABE ATTENDEES

1. Choos, Ramona G.
Chicago State University
95th & King Dr.
Chicago, IL 60628
2. Davidson, David
Illinois Office of Education
100 N. First St.
Springfield, IL 62777
3. Ehlers, Larry
Menard Correctional Center
Menard, IL 62559

CHICAGO WORKSHOP
ATTENDEE LIST

ABE ATTENDEE

Watson, Judy
113 West 60th St.
Room 1103
Fordham University
New York, NY 10023

(Missed the New York Workshop so attended the Chicago Workshop.)

ATTENDEE LIST
Metric Education Workshop
Region VI - Dallas

State of Texas

V-T ATTENDEES

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Barber, Ray
Texas Education Agency
201 E. 11th St.
Austin, TX 78701 2. Bills, Thomas L.
Physics Dept.
Texas State Technical Institute
Waco, TX 76705 3. Carter, Lloyd L.
3210 W. Lancaster
Fort Worth, TX 76107 4. Franklin, Dr. Ruth Ann
Dept. of Home Economics
Texas Christian University
Fort Worth, TX 76129 5. Exley, Ronald N.
Texas Eng. Ext. Service
Texas A & M University
F.E. Drawer K
College Station, TX 77843 6. Gambill, Joe
Great San Antonio C of C
Box 1628
San Antonio, TX 78205 7. Lindley, Patricia F.
Texas Education Agency
201 E. 11th St.
Austin, TX 78701 8. Mitchell, Brenda S.
901 O'Connor Rd.
Irving, TX 75061 9. Pickelman, Robbie
Region 10 Education Ser. Center
400 E. Spring Valley Rd.
Richardson, TX 75080 10. Rambo Walter
Texas Education Agency
201 E. 11th
Austin, TX 78701 | <ol style="list-style-type: none"> 11. Sweely, Robert
901 O'Conner
Irving, TX 75061 12. Tuckey, Charles
3600 Ross
Dallas, TX 75204 13. Ware, Barbara Ann
3700 Ross Ave.
Box 82
Dallas, TX 75204 |
|---|--|

ABE ATTENDEES

1. Bray, Lem
309 W. Terrell
Ft. Worth, TX 76109
2. DuPree, Linda
Education Ser. Center, Region XI
2821 Culler St.
Ft. Worth, TX 76107
3. Hines, Linda K.
Tarrant County Jr. College, N.W.
4801 Marine Cr. Pwy.
Ft. Worth, TX 76179
4. Roussos, Dr. Pavlos
Adult Programs, TEA
201 E. 11th
Austin, TX 78701

ATTENDEE LIST
Metric Education Workshop
Region VI - Dallas

State of Oklahoma

V-T ATTENDEES

1. Cokeley, Leonard
1515 W. 6th
Stillwater, OK 74074
2. Frazier, Don
State Dept. of Vo-Tech Education
1515 W. 6th Ave.
Stillwater, OK 74074
3. Hart, Verlin L.
State Dept. of Vo-Tech Education
1515 W. 6th Ave.
Stillwater, OK 74074
4. Hollingsworth, Tom
Guidance, State Dept. of Education
Oliver Hodge Bldg.
2500 N. Lincoln Blvd.
Oklahoma City, OK 73105
5. Moore, Rex M.
State Dept. of Education
1515 W. 6th Ave.
Stillwater, OK 74074
6. Nelson, Frank
State Dept. Vo-Tech Education
1515 W. 6th
Stillwater, OK 74074
7. Randall, Mary M.
4024 N. Lincoln
Oklahoma City, OK 73105
8. Rizley, Helen G.
4024 N. Lincoln
Oklahoma City, OK 73105
9. Weaver, Joe B.
2500 N. Lincoln
Oklahoma City, OK 73105
10. Winburn, Harold
1515 W. 6th.
Stillwater, OK 74074
11. Wright, George D.
3027 S. New Haven
Box 45208
Tulsa, OK 74145

ATTENDEE LIST
Metric Education Workshop
Region VI - Dallas

State of Louisiana

V-T ATTENDEES

1. Buck, Robert R.
P.O. Box 44064
Baton Rouge, LA 70804
2. Daigle, Edward J.
State Dept. of Education
P.O. Box 44064
Baton Rouge, LA 70804
3. Marchand, Cleveland J.
P.O. Box 44064
Baton Rouge, LA 70804
4. Moore, Robert E.
South Louisiana Vocational-Technical Institute
201 St. Charles St.
P.O. Box 5033
Houma, LA 70361
5. Parkison, Dud
Vocational Curriculum Development & Research Center
P.O. Box 657
Natchitoches, LA 71457
6. Poston, David
Vocational Curriculum Development & Research Center
P.O. Box 657
Natchitoches, LA 71457

State of New Mexico

1. Washburn, Dr. Kenneth R.
Industrial Education & Technology Dept.
New Mexico Highlands University
Las Vegas, New Mexico 87701

ATTENDEE LIST
Metric Education Workshop
Region VI - Dallas

State of Arkansas

V-T ATTENDEES

1. Heffner, Robert
Twin Lakes Vo-Tech.
Rt. 7
Harrison, AR 72601
2. Nixon, James O.
Monticello Occupational Education Center
704 Scogin Dr.
Monticello, AR 71655
3. Shipley, Paul L.
Cotton Boll Vocational Technical School
P.O. Box 36
Burdette, AR 72321

ABE ATTENDEES

1. Allen, J. Benton
Rm. 401-W Arch Ford Education Bldg.
Capitol Mall
Little Rock, AR 72201
2. Blackwell, Emmanuel J.
723 Cumberland
Little Rock, AR 72202
3. Keaton, William T.
Arkansas Dept. of Ed., Adult Ed Section
401-W Arch Ford Education Bldg.
Little Rock, AR 72201
4. Payne, Mack
623 West Second
Pine Bluff, AR 71601
5. Schiffner, Larry
501 S. 20th
Pt. Smith, AR 72901
6. Johnson, Calvin
401-W Arch Ford Bldg.
Little Rock, AR 72201

ATTENDEE LIST
Metric Education Workshop
Region VII - Kansas City

State of Nebraska

V-T ATTENDEES

1. Clawson, Dean L.
Lincoln High School
22nd & J St.
Lincoln, NE 68510
2. Clous, Carl E.
University of Nebraska at Omaha
414 F Kayser Hall
P.O. Box 688
Omaha, NE 68101
3. Corqan, Virginia
390 Teachers College
University of Nebraska-Lincoln
Lincoln, NE 68588
4. Gredesky, Bill
Northeast Technical Community College
801 E. Benj Ave.
Norfolk, NE 68701
5. Harouff, Marge
301 Centennial Mall South
Lincoln, NE 68509
6. Lake, Richard K.
451 Steinway
Lincoln, NE 68505
7. Larson, C. Victor
4469 Farnam
Omaha, NE 68131
8. Michaelis, C. LeRoy
Box 42 Henzlik Hall
University of Nebraska-Lincoln
Lincoln, NE 68588
9. Wiener, Dr. Darrell
Division of Business
Wayne State College
Wayne, NE 68787

ABE ATTENDEES

1. Zalewski, Dr. Donald L.
Kayser Hall 107C
University of Nebraska at Omaha
Omaha, NE 68101

ATTENDEE LIST
Metric Education Workshop
Region VII - Kansas City

State of Missouri

V-T ATTENDEES

1. Brightwell, B. Eugene
Mo. Dept. of El. & Sec. Ed.
Box 480
Jefferson City, MO 65101
2. Herd, Amon
10 Industrial Education Bldg.
University of Missouri
Columbia, MO 65201
3. Raithel, Kay
Mo. Advisory Council on Voc. Ed.
630 W. Main St.
Jefferson City, Mo 65101
4. Randall, Dr. Gerald A.
Senior Program Officer
Adult Education Programs
U.S. Office of Education
601 E. 12th St., Rm. 458
Kansas City, MO 64106
5. Rawls, Byron
Dir., V-T Education
U.S. Office of Education
601 E. 12th St.
Kansas City, MO 64106
6. Schlueter, Janis M.
Cass County AVTS
1600 E. Elm
Harrisonville, MO 64701
7. Thompson, Les
U.S. Office of Education
601 E. 12th St.
Kansas City, MO 64106

ABE ATTENDEES

1. Brown, Antronette
1514 Campbell
Kansas City, MO 64108
2. Carpino, Mike J.
Adult Learning Center
7809 Woodson
Raytown, MO 64138
3. Long, Elvin
State Dept. of El. & Sec. Ed.
P.O. Box 480
Jefferson City, MO 65101
4. Montalto, Barbara
Pioneer Community College
560 Westport Rd.
Kansas City, MO 64111
5. Pileggi, Shelley
314 S. Washington
Sedalia, MO 65301
6. Presson, Mavis
1111 Westwood Blvd.
Poplar Bluff, MO 63901
7. Ullom, Mary
Adult Basic Education Center
307 E. Cleveland
Monett, MO 65708
8. Westwood, Mary Jo
310 N. Providence Rd.
Columbia, MO 65201

ATTENDEE LIST
Metric Education Workshop
Region VII - Kansas City

State of Kansas

V-T ATTENDEES

1. Ashley, Theda
Emporia State College
Emporia, KS 66801
2. Beacham, Ralph
State Dept. of Education
120 E. 10th
Topeka, KS 66612
3. Edwards, James D.
Vocation Technical Institute
Kansas State College of Pittsburg
Pittsburg, KS 66762
4. Lowallen, Sterling B.,
Wichita State University
Wichita, KS 67208
5. Oberle, Carol
State Dept. of Education
120 E. 10th
Topeka, KS 66612
6. Preston, Wilma
State Dept. of Education
120 E. 10th
Topeka, KS 66612
7. Smith, Fred J.
Kansas State College of Pittsburg
Pittsburg, KS 66762
8. Smith, Walter S.
University of Kansas
205 Bailey Hall
Lawrence, KS 66045
9. Spena, Elton
State Dept. of Education
120 E. 10th
Topeka, KS 66612
10. Woods, Harold
Industrial Ed Dept.
Emporia Kansas State College
1200 Commercial
Emporia, KS 66802

ABE ATTENDEES

1. Funk, Diana
Colby Community College
135 W. 6th
Colby, KS 67701
2. Patterson, Eugene
613 N. 3rd
Hill City, KS 67642

ATTENDEE LIST
Metric Education Workshop
Region VII - Kansas City

State of Iowa

V-T ATTENDEES

1. Berryhill, Harold
State Dept. Public Instruction
Grimes State Office Building
Des Moines, IA 50319
2. Bro, Ronald
Dept. of Industrial Technology
University of Northern Iowa
Cedar Falls, IA 50613
3. Greer, Rebecca
401 Reed St.
Red Oak, IA 51566
4. Johnson, Robert L.
Graceland College
Lamoni, IA 50140
5. Kundel, Susan
American College Testing Program
P.O. Box 168
Iowa City, IA 52240
6. Teig, Dr. Nick
University of Northern Iowa
Cedar Falls, IA 50613
7. Weston, Enoch A.
Indian Hills Community College
Ottumwa Industrial Airport
Ottumwa, IA 52501

ABE ATTENDEES

1. Brock, Kathy
Northwest Iowa Technical College
Sheldon, IA 51201
2. Kerfoot, Karen
Indian Hills Community College
Bldg. 41
Ottumwa Ind. Airport
Ottumwa, IA 52501
3. Lewis, Jean
Southeastern Community College
South Campus
Box 27
285 Messenger
Keokuk, IA 52632
4. Sellen, Jane B.
Western Iowa Tech
Box 265
4647 Stone Ave.
Sioux City, IA 51102
5. Stephens, Barbara
Southwestern Community College
1501 W. Townline Rd.
Creston, IA 50801

NON-REGIONAL ATTENDEES

1. Carter, R. Jane
Minnesota Instructional Materials Center
3554 Whitebear Ave.
Whitebear Lake, MN 55110
2. Roark, Ivan W.
Coordinator of Technology
Tulsa Jr. College
10th & Boston
Tulsa, OK 74119

DENVER METRIC WORKSHOP
ATTENDEE LIST

State of Colorado

V-T ATTENDEES

1. Boettcher, Hans A.
Colorado Mountain College
East Campus
Leadville, CO 80461
2. Dalke, John L.
Chief Office of Measurement Services
National Bureau of Standards
Boulder, CO 80302
3. Lewis, Wiley B.
Department of Vocational Education
Colorado State University
Vocational Education Bldg.
Ft. Collins, CO 80523
4. Nierman, Ross
Larimer County V-T Center
P.O. Box 2397
Ft. Collins, CO 80522
5. Hair, Luann
2903 State Fm. Rd. #1
Evans, CO 80620
6. Ruda, Fred
2101 - 27th Ave. Ct.
Apt. #2
Greeley, CO 80631

DENVER METRIC WORKSHOP
ATTENDEE LIST

ABE ATTENDEES

1. Becker, Joe
Adult Education
3227 Chase St.
Wheat Ridge, CO 80033
2. Brennan, John S.
Colorado Dept. of Education
Denver, CO 80203
3. Hoffman, Bob
1111 W. Colfax
Denver, CO 80204
4. Rahm, Jan
Right to Read
Colorado Dept. of Education
201 E. Colfax
Denver, CO 80203
5. Sokol, Louis
U.S. Metric Association
Sugarload Star Route
Boulder, CO 80302
6. Terrazas, Art
Aims Community College
P.O. Box 69
Greeley, CO 80631

DENVER METRIC WORKSHOP
ATTENDEE LIST

State of Montana

V-T ATTENDEES

1. Jenkins, Gary W.
1115 N. Roberts
Helena, MT 59601
2. Wallace, Gordon L.
Billings Career Education Center
3723 Central Ave.
Billings, MT 59102
3. Weaver, Willard R.
Great Falls Public Schools
Box 2428
Great Falls, MT 59403

ABE ATTENDEE

1. Thomas, Larry
O.P.I.
Capital Bldg.
Helena, MT 59601

DENVER METRIC WORKSHOP
ATTENDEE LIST

State of North Dakota

V-T ATTENDEES

1. Hull, Patricia
T & C Dept.
College of Home Economics
North Dakota State University
Fargo, ND 58102
2. Klein, Sandy (Also attended part of the ABE session)
3315 S. Airport Rd.
Bismarck, ND 58501

DENVER METRIC WORKSHOP
ATTENDEE LIST

State of South Dakota

ABE ATTENDEE

1. Hala, Marilyn
New State Office Bldg.
Pierre, SD 57501

V-T ATTENDEE

1. Oleson, E. B.
State Office Bldg. #3
Pierre, SD 57501

DENVER METRIC WORKSHOP
ATTENDEE LIST

State of Utah

V-T ATTENDEES

1. Blanchard, Don L.
Southern Utah St-te College
Cedar City, UT 84720
2. Christensen, Sheron
Weber School District
1122 Washington Blvd.
Ogden, UT 84404
3. Donaldson, Lena
Horace Mann Community Education
233 W. 2nd North
Salt Lake City, UT 84111
4. Grover, Jerry
230 SNLB - Ind. Ed Dept.
Brigham Young University
Provo, UT 84602
5. Hill, Garth A.
230 SNLB - Ind. Ed. Dept.
Brigham Young University
Provo, UT 84602
6. Osborne, Joe
695 S. Orchard Dr.
Bountiful, UT 84010
7. Thatcher, Reed H.
Jordan School District
9361 S. 400 East
Sandy, UT 84070
8. Wallis, Dr. Carl R.
Utah State University
Logan, UT 84322
9. Zollinger, Clinton
Director Vocational Ed
Davis County School District
45 E. State St.
Farmington, UT 84025

DENVER METRIC WORKSHOP
ATTENDEE LIST

State of Utah

ABE ATTENDEES

1. Allen, Joe
Granite School District
340 East 3545 South
Salt Lake City, UT 84115
2. Salisbury, Edward O.
233 West 200 North
Salt Lake City, UT 84103

DENVER METRIC WORKSHOP
ATTENDEE LIST

State of Wyoming

V-T ATTENDEES

1. Futrell, Dr. William M.
Wyoming State Dept. of Education
241 Hathaway Bldg.
Cheyenne, WY 82002
2. Gade, Dolores
Dept. of Vocational Education
University of Wyoming
Laramie, WY 82071
3. Lundy, Lyndall L.
Voc. Education Dept.
College of Education
University of Wyoming
Laramie, WY 82071
4. Reynolds, Carl L.
Box 3374, University Station
University of Wyoming
Laramie, WY 82070
5. Zancanella, Dr. James
Dept. of Vocation Education
College of Education
University of Wyoming
Laramie, WY 82071

ABE ATTENDEES

1. Brattin, Terry
340 S. Center St.
Casper, Wy 82601
2. Olson, Melfried
Box 3992, University Station
Laramie, WY 82071

ATTENDEE LIST
San Francisco Workshop
State of California

- | | |
|---|---|
| <p>1. Aho, Carolyn
1440 Harrison
San Francisco, CA 94103</p> <p>2. Bennion, C. Kent
U.S. Office of Education
50 Fulton St.
San Francisco, CA 94102</p> <p>3. Bielefeld, Carole
P.O. 11846
Santa Ana, CA 92711</p> <p>4. Bunten, John
U.S. Office of Education
50 Fulton St.
San Francisco, CA 94102</p> <p>5. Cronenwett, Susan
2705 K St., Suite 5A
Sacramento, CA 95816</p> <p>6. Cunningham, Bill
Vocational Education
Oakland Unified Schools
Castlemont High School
8601 MacArthur Blvd.
Oakland, CA 94605</p> <p>7. Farrell, Lonnie
1200 Cornwell St., Room 103
Los Angeles, CA 90033</p> <p>8. Hanson, Sue
American Institutes for Research
P.O. Box 1113
Palo Alto, CA 94302</p> <p>9. Hill, Mary Lou
721 Capitol Mall, 4th Fl.
California State Dept. of Education
Sacramento, CA 95814</p> <p>10. Hoffman, Joe
Math Unit
State Dept. of Education
721 Capitol Mall
Sacramento, CA 95814</p> | <p>11. Kopriva, Phil C.
1311 Sutter St.
San Francisco, CA 94109</p> <p>12. Lawrenson, Raymond M.
U.S. Office of Education
50 Fulton Street, Room 351
San Francisco, CA 94102</p> <p>13. McLea, Dr. Kenneth R.
San Francisco Unified School Dist
Career & Vocational Ed Dept., Rm.
135 Van Ness Ave.
San Francisco, CA 94102</p> <p>14. Miller, Janet
142 W. 75th St.
Los Angeles, CA 90003</p> <p>15. Miller, Martin
J.J. Keller (Metric Bulletin -West
Coast Editor)
406 W. Regent Street #8
Inglewood, CA 90301</p> <p>16. Peterson, Charles O.
914 Fourth St.
Clovis, CA 93612</p> <p>17. Rask, Michael L.
2705 K St., Suite 5A
Sacramento, CA 95816</p> <p>18. Reyes, Dr. Jeffrey G.
721 Capital Mall
Sacramento, CA 95814</p> <p>19. Rhinehart, Charles H.
Sonoma State College
1801 E. Cotati Ave.
Rohnert Park, CA 94928</p> <p>20. Smith, Sid
Marin County Schools Office
201 Tamal Vista Blvd.
Corte Madera, CA 94925</p> <p>21. Suretz, Linda
State Dept. of Education
1405 Commons Dr.
(no city given)</p> |
|---|---|

ATTENDEE LIST
San Francisco Workshop
State of California

22. Tardif, Robert
Calif. State Dept. of Education
721 Capitol Mall
Sacramento, CA 95814
23. Weaver, Mary T.
Mesa Verde High School
7600 Lauppe Lane
Citrus Heights, CA 95610
24. Young, Lorelle
West High School
20401 Victor,
Torrance, CA 90503

SAN FRANCISCO WORKSHOP
ATTENDEE LIST
State of Arizona

Beisecker, Carl E.
Arizona Dept. of Education
1535 W. Jefferson
Phoenix, AZ 85007

Koningsor, Deborah L.
1535 W. Jefferson,
Phoenix, AZ 85007

Segleni, Marvin
1535 W. Jefferson
Phoenix, AZ 85007

SAN FRANCISCO WORKSHOP
ATTENDEE LIST
State of Hawaii & Possessions

1. Cabrera, Juan T.
Mathematics Specialist
HQ Education
Trust Etrritory of the Pacific Islands
Saipan, M. I. 96950
2. Journigan, Russ
State Dir. of Vocation Ed
American Samoa Community College
P.O. Box 2609
American Samoa
Pago Pago, Samoa 96799
3. Nook, Dorothy, MMB
Adult Education Specialist
Department of Education
Majuro, Marshalls 96960
4. Shigetomi, Samson S.
State Director for Vocational Education
2444 Dole St.
Honolulu, Hawaii 96822

SAN FRANCISCO WORKSHOPATTENDEE LIST

State of Nevada

Gutzman, Ron
Nevada Dept. of Education
Capitol Complex
200 W. King St.
Carson City, NV 89710

Peddicord, Jim
Nevada Dept. of Education
Capitol Complex
400 W. King St.
Carson City, NV 89710

SEATTLE WORKSHOP
ATTENDEE LIST

State of Alaska

V-T ATTENDEES

1. Finch, Warren I.
3750 Geist Rd.
Fairbanks, AK 99701
2. Oleson, William C.
4600 Debarr
Anchorage, AK 99504

SEATTLE WORKSHOP
ATTENDEE LIST

State of Idaho

V-T ATTENDEES

1. Branson, Helen
1000 W. Garden
Coeur D' Alene, ID 83814
2. Carter, Lee
State Dept. of Vocational Education
750 W. State
Boise, ID 83720
3. Sutcliffe, Roy M.
School of Vo-Tech Education
Idaho State University
Pocatello, ID 83201

ABE ATTENDEE

1. Dunlap, Florence B.
Lewis-Clark State College
Lewiston, ID 83501

SEATTLE WORKSHOP
ATTENDEE LIST

State of Oregon

V-T ATTENDEES

1. Cook, Gerald
Portland Community College
12000 S.W. 49th
Portland, OR 97219
2. Fuller, Bob
Roosevelt High School
6941 N. Central St.
Portland, OR 97203
3. Hawks, Gerald A.
12000 S.W. 49th
Portland, OR 97219
4. Mahr, Peter
John Adams High School
5700 N.E. 39th Ave.
Portland, OR 97211
5. Reedy, Gary E.
Portland Community College
12000 S.W. 49th
Portland, OR 97219
6. Whisenant, E. S.
Clackamas Community College
19600 S. Molalla Ave.
Oregon City, OR 97045

SEATTLE WORKSHOP
ATTENDEE LIST

State of Washington

V-T ATTENDEES

11. Harry, Raymond L.
319 E. 7th St.
Olympia, WA 98504
12. Kerr, Sam
Assist. Regional Commissioner
U.S. Office of Education
1321 Second Ave.
Seattle, WA 98101
13. Kinney, Gordon D.
Washington State Reformatory
P.O. Box 777
Monroe, WA 98272
14. Klemm, Dr. V. Wayne
Central Washington State College
Ellensburg, WA 98926
15. Leavitt, David
Senior Program Officer
U.S. Office of Education
Arcade Plaza Bldg.
1321 Second Ave.
Seattle, WA 98101
16. Moon, Donald E.
Dept. of Technology
Western Washington State College
Bellingham WA 98225
17. Ostrander, Dr. Joyce
Seattle Pacific University
101 McKinley
Seattle, WA 98119
18. Postlewaite, Beverly
Commission for Vocational Education
Olympia, WA 98504
19. Reid, Robert R.
South Seattle Community College
6000 - 16th Ave., S.W.
Seattle, WA 98106

SEATTLE WORKSHOP
ATTENDEE LIST

State of Washington

V-T ATTENDEES

1. Bakamis, Dr. William A.
Dept. of Education
Washington State University
Pullman, WA 99164
2. Beal, Jack L.
115 Miller Hall
University of Washington
Seattle, WA 98195
3. Bell, Herbert Y.
Industrial Arts Education
Office of Supt. of Public Instruction
Old Capitol Bldg.
Olympia, WA 98504
4. Bigger, Gene
Washington Comm. for Voc-Ed
Olympia, WA 98502
5. Blue, James L.
State Board Community College Education
319 E. 7th Ave.
Olympia, WA 98504
6. Bruntlett, John E.
Dept. of Ind. Ed & Tech
Eastern Washington State College
Cheney, WA 99004
7. Charnley, Lucile
Tacoma College
Tacoma, WA 98465
8. Danielson, Alvin B.
2000 N. Greene St.
Spokane, WA 99207
9. Devin, Carl G.
Lower Columbia College
Longview, WA 98632
10. Dudley, Stanley A.
Hogue Technology Bldg.
Central Washington State
Ellensburg, WA 98926

SEATTLE WORKSHOP
ATTENDEE LIST

State of Washington

V-T ATTENDEES

20. Rockefeller, W. Phillips
Regional Commissioner
Office of Education, Rm. 6058
Arcade Plaza
1321 Second Ave.
Seattle, WA 98101
21. Stiger, Tom
Everett School District
4730 Colby Ave.
Everett, WA 98203
22. Taylor, Jay G.
Seattle School Dist. #1
520 N.E. Ravenna Blvd.
Seattle, WA 98115
23. Voytko, John J.
300A Miller Hall, DQ 12
University of Washington
Seattle WA 98195
24. Workman, Robert
Bureau Chief
New Federal Bldg.
915 Second Ave.
Seattle, WA 98101

SEATTLE WORKSHOP
ATTENDEE LIST

State of Washington

ABE ATTENDEES

1. Alloway, Maxine
Continuing Education Center
4521 N. Ash
Spokane, WA 99208
2. Beardslee, Dr. Edward
Seattle Pacific University
Seattle, WA 98119
3. Bryson, Theodore P.
5217 Northwest Rd.
Bellingham, WA 98225
4. Johnson, Lee
Fort Steilacoom Community College
9404 E. 112th
Puyallup, WA 98371
5. Moisieo-saeger, Thea
P.O. Box 46296
Seattle, WA 98146
6. Roestel, Ray
108 N. Washington St.
Spokane, WA 99204
7. Wingert, Glenn L.
1705 Broadway - BE 3122
Seattle, WA 98122